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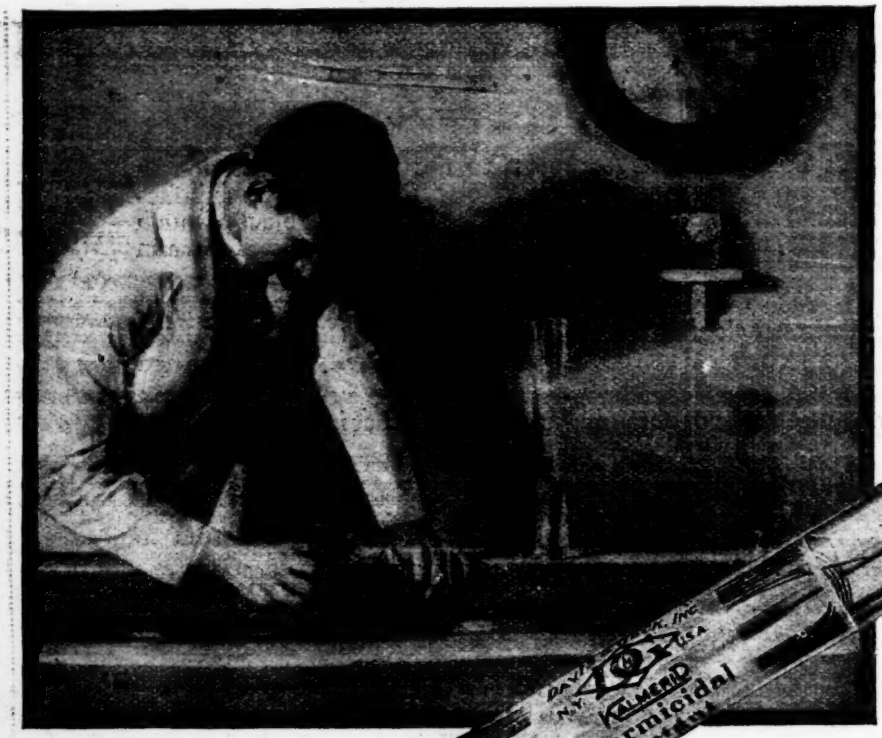

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A British Medical Association Lecture

ON

THE NATURE AND TREATMENT OF AURICULAR FIBRILLATION.*

BY

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THE choice of this subject has been largely determined by three considerations: (*a*) the disease is very common, (*b*) its nature is comparatively well understood, (*c*) much can be done by adequate treatment.

Intelligent treatment of the condition must depend upon an appreciation of the functional pathology of the disease, any understanding of which, in turn, connotes a familiarity with the present teachings of cardiac physiology.

Normal cardiac contraction is determined by the rhythmic generation of impulse material at the pacemaker—that mass of primitive tissue lying in the right auricle, near its junction with the superior cava, known as the sino-auricular node. Experimental proof of this does not come within the scope of this paper, but can be found elsewhere very clearly presented.[1]

The speed of the pacemaker is controlled by the interaction of (*a*) the vagus, stimulation of which slows the pacemaker, and (*b*) the sympathetic, which in turn raises the speed. The contraction impulse, having been formed in the sino-auricular node, spreads throughout the myocardium in definite orderly sequence. There is much evidence to show, and it is now generally believed, that the impulse spreads across the sheet of auricular muscle by contiguity of muscle fibre, and in no other way. Each auricular fibre is believed to hand on its stimulus to its neighbour, by which means the whole sheet is put into contraction, commencing around the great veins, and ending at the auriculo-ventricular junction.

Conduction of the contraction impulse is carried in turn to the ventricle, by means of the auriculo-ventricular node and bundle, and again in no other way, for total destruction of the bundle, by disease or experiment, prevents the auricular impulse from reaching the ventricle, and the auricular contraction is then followed by no ventricular response. The auriculo-ventricular bundle, on reaching the ventricular area, divides into right and left branches to be distributed to each ventricle respectively, by means of complex branching and arborization on the endocardial surface of the muscle, and ends in the Purkinje tissue, by means of which the impulse is believed to be handed on to the ventricular musculature.

There is, then, a complex and elaborate conduction system which carries the contraction impulse from the auricle, across the tissue of the auriculo-ventricular junction, and distributes the impulse to the ventricular muscle—an arrangement in sharp contrast to that of the auricle, where the impulse-spread, from its point of generation at the sino-auricular node, depends upon contiguity of muscle fibre only, and no conduction system exists.

It has long been known that the heart will respond to direct electrical stimulation, and if this be carried out at the apex of the auricular appendix, the speed of the heart can be raised above the speed dictated by the pacemaker; but if the speed be raised to 250 beats a minute, or thereabouts, a certain number of impulses fail to reach the ventricle. In fact, the auriculo-ventricular junctional tissue shows phenomena of fatigue before the cardiac muscle mass.

It is further known that stimulation of the vagus, particularly on the left side, is capable of reducing the conduction capacity of the bundle, even when the heart is not beating at high speed, and so a certain number of auricular impulses are prevented from reaching the ventricle—in other words, the auriculo-ventricular conduction system may be partly or completely "blocked" to auricular impulses by disease or other damage to the bundle, or by vagal stimulation. When complete block occurs, the ventricle initiates its own rhythm, which is regular, but very much slower than normal pacemaker rhythm, and is usually about 32 a minute, but may be either higher or lower.

From this it follows that, when the auricle is beating at high speed, a very slight depreciation of the capacity to conduct possessed by the bundle will suffice to arrest a certain number of auricular impulses; in this way the ventricle may be guarded against the fatigue and damage of a high auricular rate, and a sufficient depression of conduction would be easily brought about by vagal stimulation of a mild grade.

A great deal of experimental work has been done upon the results of high-speed direct stimulation of the heart's auricular appendix. It is found that when the stimulation speed rises to 300 to 500 a minute the ventricular responses are usually grossly irregular in force and rhythm. In some cases cessation of stimulation is not followed by return to normal rhythm, but the events in the heart continue exactly as if electrical stimulation were still going on.

It is believed that this phenomenon is due to partial fatigue of the auricular muscle, with the result that a contraction wave runs round a ring of the musculature, probably that muscular band which embraces the mouths of the great veins. The impulse is believed to run in one direction only, and to act as the stimulus for the whole auricular muscle. The condition is known as circus movement; it can only occur at high speeds, and no definite organized muscular contraction results; the capacity of the auricular cavity is not reduced by the muscle contractions, the fibres of the muscle being in a condition of continual quiver.

There is evidence to show that at speeds of about 300 a minute the path of the circus movement remains identical, as does the path of its offsets, but that the auriculo-ventricular bundle is unable to conduct all the impulses reaching it (300), with the result that every other or every third beat only is allowed to reach the ventricle, constituting 2:1 or 3:1 block, and yielding a ventricular rate of 150 or 100 respectively. This condition is known as auricular flutter.

When, however, the speed of circus movement in the auricular muscle rises to 450 a minute or thereabouts the path of the circuit is constantly changing, as is the path of the offset waves, the progress of both being constantly impeded by fibres still fatigued, and therefore refractory to stimulation. The result is an irregular circus movement, constantly changing its course, and irregular offset waves which may, or may not, succeed in traversing the whole of the auricular muscle sheet. From this it follows that the arrival of impulses at the auriculo-ventricular junctional tissue will be both high in speed and irregular in rhythm. The consequent ventricular responses will show a like result, and the ventricular stroke, therefore, becomes grossly irregular and of high speed. This condition constitutes auricular fibrillation.

Our knowledge of this condition as it at present stands is due almost entirely to electro-cardiography, and any consideration of the disease must include some reference to graphic records obtained by this means. The normal electro-cardiogram demonstrates a wave due to auricular activity, which is easily recognized and identified as separate from the deviations due to ventricular activity. In auricular fibrillation the auricular wave disappears and is replaced by undulations which are irregular in rhythm, and which appear and disappear in the length of the tracing. The ventricular complexes are grossly irregular in rhythm and in size, but their form remains quite unaltered. From this it was concluded (*a*) that no organized sequential auricular contraction takes place, and (*b*) that the stimulus to ventricular contraction reaches the muscle by the usual paths—that is, the auriculo-ventricular bundle and its branches. The irregular and constantly varying undulations are attributed to the ever-changing course of the circus movement within the auricular muscle.

Clinically auricular fibrillation is too familiar to need much description: the pulse is perpetually and grossly

* The substance of a lecture delivered before the Hastings Division, March, 1927.

irregular; the speed is usually raised, in which case all the beats do not usually reach the radial artery; there is a definite "pulse difference" between the apical rate and the radial pulse. Signs of cardiac insufficiency are usually present, but may be declared by any phase between undue pulse rise and dyspnoea on effort, up to fully developed orthopnoea and anasarca.

The grade of the disease is usually estimated by the speed of the resting pulse—in most cases the higher the speed the more the discomfort; but this is not constantly so—there is a group in which the cardiac speed is never high, but the cardiac insufficiency is marked and obvious; this, however, is the exception rather than the rule.

The rise in the cardiac speed is probably the largest factor in the heart's breakdown. There is no auricular stroke to fill the ventricle, so that any shortening of diastole must leave the ventricles inadequately filled, the muscle inadequately stretched, the ventricular stroke of poor force, and the consequent circulatory effect indifferent.

If by any means the ventricular speed can be controlled and reduced a definite sequence of events will follow: the prolongation of diastole will permit of adequate ventricular filling; the ventricular muscle fibres will be thereby sufficiently lengthened to yield a contraction of good force; the ventricular muscle will receive sufficient rest for full recovery after each contraction; the general nutritional state of the heart muscle by way of the coronary arteries will be materially improved.

The treatment of auricular fibrillation may be considered under two heads: (1) the control of the high ventricular speed with consequent general improvement of the circulation, and (2) the re-establishment of a normal cardiac rhythm.

For the control of ventricular speed drugs of the digitalis group have enjoyed a very long reputation, but the large number of preparations at present offered to the profession would argue rather that the results obtained are by no means always satisfactory, and a review of the effect of the drugs under scientific observation may not be out of place. The criterion of action of the drug must be ventricular slowing, for that is the most usual result aimed at in administration.

In judging of the effects of the drug three factors must obviously be considered: (*a*) the dose given, (*b*) the preparation used, and (*c*) the potency of the preparation. At the outset, for purposes of careful clinical observation, it becomes necessary to limit investigation to one preparation of one drug, and the vast bulk of the work has been done with tincture of digitalis. The use of other preparations of other drugs will not give easily comparable results. Even so, the potency of various tinctures has been shown to vary sufficiently to make comparisons difficult, and preparations are now frequently labelled "standardized by physiological assay" in an attempt to overcome this difficulty. Without entering into the technicalities of physiological tests of this sort many methods have been tried, but it must be remembered that effects produced in the artificially perfused heart do not necessarily represent results obtainable under clinical conditions, and that injection methods allow the whole contents of the tincture to act, whereas gastro-intestinal absorption may only be possible to certain compounds in the galenical preparation.

A recent method which we owe to the Pharmaceutical Society's laboratories is to hold a standard powdered leaf, and from this to make a tincture by a standard method, to compare the results obtained by experiment with this standard tincture to results obtained under identical conditions with the unknown tincture to be tested, and to express the result in percentage potency of the standard. Even so, it is tenable that the result attained must be corrected by observation under clinical conditions, as matters at present stand.

The dose of the drug, the preparation used, and the potency of the preparation all having been fixed, there yet remains another factor. It has been clearly recognized ever since Mackenzie's early work on the irregular pulse that the results obtained by digitalis administration in auricular fibrillation are totally different from the results obtainable by giving the drug to the patients with high speed pulses from any other cause,[2] the one possible exception being auricular flutter.

In using the ordinary pharmacopoeial dose of the drug it is well known that immediate results are not to be looked for. The drug is said to be dangerous because its action is cumulative, and, under ordinary dosage, benefit can be expected after about a week. It would appear from this that the drug must be allowed to cumulate in the body until a certain degree of concentration or saturation has been attained. On the other hand, it would seem somewhat illogical to induce the saturation point slowly while the patient is suffering all the distress and discomfort of complete cardiac failure. Mackenzie has shown that the full effect of the drug can be attained by giving the tincture at the rate of a drachm a day,[3] and that the time occupied is five to seven days.

The matter was carried considerably further by Eggleston,[4] who worked with a tincture which had been standardized by the Hatcher and Brody cat unit method. The minimal lethal dose per kilo of body weight of cat had been carefully determined, and the tincture was used by Eggleston in the treatment of auricular fibrillation, the action of the drug being carefully watched both clinically and graphically. By this means it was found that one cat unit was usually represented by one cubic centimetre of a good-class active tincture, and that the full therapeutic effect could be attained clinically by the administration of a dose calculated on the basis of 0.1 c.cm. per lb. body weight of the patient. This dose was administered in three portions extending over a period of eight to twelve hours.

This is now known as Eggleston's method of massive digitalis administration. Toxic results do not follow, as the dose is carefully calculated to fall short of the toxic amount. The method has permitted of a much closer and more satisfactory study of digitalis effects. Robinson[5] has shown that some therapeutic effect is recognizable within two to four hours after administration, and that the full therapeutic effect is attained usually at the end of six hours. Pardee[6] has estimated that the duration of the good effect is from six to ten days, and that the rate of elimination is about 25 minims a day.

Given by this method of massive dose, therapeutic results are very rapidly attained, but it is imperative that the potency of the tincture used be fully known.

A modification of this method has been in use in my hospital service—the full calculated dose at the rate of 0.1 c.cm. per lb. body weight of patient has been given as a haustus made up to ʒ iij with sodium bicarbonate, aromatic spirits of ammonia, and chloroform water. Electrocardiograms have been taken before and every two hours after administration, until five or six tracings have been made. With the particular tincture used, and at this rate of calculation, a full therapeutic effect was not frequently attained, and the tincture would therefore appear to be somewhat weaker than that used by Eggleston. The T-wave of the electro-cardiogram in Lead II was not usually inverted even at the end of eight hours, but the slowing effect was well marked in nearly all cases within that time. Toxic effects did not occur except in one case; the nature of the changes in this case are not understood, but the pulse rose considerably in frequency and the electro-cardiogram became profoundly altered, suggesting some severe toxic effect upon the heart, but nausea and vomiting did not manifest themselves.[7]

Altogether 54 cases have been treated by this method. The average dose of the tincture administered was 13 c.cm.; the average pulse speed before administration was 140, whereas eight hours later the average speed was 91. The average duration of satisfactory effect was six days, so that small routine doses of the tincture were usually necessary at the end of a week. Vomiting occurred in two cases, both of which had been given a dose calculated on a basis of 0.15 c.cm. per lb. body weight, a rate which was too high for the tincture used.

That the effect of digitalis in auricular fibrillation stands by itself, and has no counterpart when the drug is administered to hearts at normal rhythm, is clearly shown in the following table, in which it will be noticed

that no slowing of the pulse takes place as the result of exhibition of the calculated dose.

	Age.	Dose.	Before.	After.
Normal rhythm.				
Wy.; F.	48	11.3 c.cm.	132	132
Bs.; M.	41	15.9 c.cm.	108	108
Sd.; M.	35	13.7 c.cm.	84	84
Fibrillation.				
Tn.; M.	56	11.2 c.cm.	144	90
Lp.; M.	41	15.6 c.cm.	132	108
Ht.; F.	57	13.0 c.cm.	144	84
Fibrillation on a larger dose.				
Cd.; F.	36	36.5 c.cm.	180	96 (vomited)
Wy.; F.	39	20.0 c.cm.	144	96 (vomited)

The clinical indications for this method of administration of the drug would appear to be clear—a large dose is only indicated to save time and suffering, and therefore only in the presence of cardiac breakdown of the major type, with dyspnoea to the point of distress, or marked anasarca. Under such conditions the pulse speed, or rather the apical cardiac rate, is materially raised in most cases, and it is in these that the most brilliant demonstrable results are attained. At the same time the method has been used where cardiac failure with fibrillation is present in spite of an apical rate of under 100 a minute, and under these conditions the results are just as satisfactory and no untoward effects have occurred.

In a considerable proportion of cases the patient has already been given digitalis, or members of that therapeutic group in some form or other, and toxic effects are certain to result if a large dose be administered when the patient is already to some extent under the influence of the drug. In view of the calculated excretory rate of 25 minims a day, and the duration of effect as seven days,[6] some estimate of the therapeutic position is best arrived at by calculating the excess of tincture received in the previous week over (175 ♏ or) ʒ iij, and deducting this from the therapeutic dose calculated at 0.1 c.cm. per lb. body weight.

A very real difficulty, however, remains with regard to the potency of the tincture which is actually administered to the patient; provided the preparation is in constant use and under careful clinical criticism, the difficulty is small, but this is only likely to be so in hospital service. At the same time, the calculation at the rate given above is sufficiently far removed from the toxic dose to permit of 25 per cent. increase in potency of any tincture over the normal, without producing any severe toxic signs.[4] And moreover, since vomiting is an early toxic effect, it will probably mechanically protect the patient from further absorption, and thus from further damage. It may be remarked in passing that preparations of digitalis which cannot produce vomiting are likely to be inert in all other respects, and that the vomiting itself is a valuable indication. Want of response to digitalis therapy in auricular fibrillation is not a tenable statement, unless and until vomiting has been caused by the drug. It has been remarked, however, that the vomiting caused by a massive dose of digitalis differs materially from that which arises in the course of prolonged and continuous administration of the drug. Of the two cases in this series in which vomiting occurred one vomited twice within three hours, and the other four times within five hours; in both cases no further gastric disturbance was observed. This differs widely from the results of long-continued digitalis administration, in which, when vomiting starts, it is most likely to continue for four days, with much gastric disturbance.

As already stated, the administration of a massive dose of digitalis is only advocated as a measure of urgency, to overcome the suffering and discomfort always associated with complete cardiac breakdown. This having been accomplished, there yet remains the future condition of the patient to be considered and treated. The beneficial effects of a massive dose usually begin to disappear at the end of six or seven days, the indication being a distinct rise in the pulse frequency. All the cases in this series have remained at rest in bed for at least a week after the initial large dose; usually at the end of that time the pulse has returned to 100 a minute or thereabouts. The patient is then allowed up for a short time each day, and is started on tincture of digitalis, 5 minims three times daily. It is usually necessary to increase this amount up to 10 minims thrice daily, in order to maintain the pulse at 90 a minute after half an hour's rest in the recumbent position immediately after the mid-day meal. Lewis has pointed out that in auricular fibrillation the pulse speed may be set to a nicety by means of digitalis;[8] the speed and conditions quoted above are the ones which are aimed at.

Experience goes to show that one large factor in the causation of cardiac breakdown in auricular fibrillation is the cessation of digitalis dosage. This has been repeatedly emphasized in the past,[9] and it is probably true that to enter upon digitalis life is much the same as to enter upon catheter life—continuance of the usage is imperative. The bugbear of "cumulative effect" still appears to sway the mind of the profession, but, as has already been pointed out, the drug is probably inactive until a certain degree of cumulation has taken place, and it is only the maintenance of this cumulative effect that will save the patient from disaster.

The precise method of action of digitalis yet remains unproven, but for purposes of therapeutic judgement it is wise to regard the drug as affecting the vagus.[10 11] Sufficient drug must be used to stimulate the vagus up to a point where the degree of auriculo-ventricular block is just sufficient to allow impulses to pass at about normal speed from auricle to ventricle; when the block exceeds this in degree, and particularly when coupled beats, giving bigeminy, arise, the vagus is being overstimulated and vomiting is near.

An estimate of the daily excretory loss of the drug can be formed, as Pardee has pointed out, by determining the average daily dose necessary to maintain a certain clinical effect over a period of time. In the out-patient clinic the usual dose necessary for patients up and about and following such light occupations as auricular fibrillation will generally permit is 30 minims daily, and it is given in three daily doses. Over a large series of cases it is found that smaller doses require periodic increase, while larger doses require periodic decrease.

The general supervision and treatment of these patients calls for careful and frequent examination, and constant small adjustments of their lives, requiring experience and worldly wisdom, but the results attained are very satisfactory. No effect whatever must be looked for upon the irregularity of the pulse under digitalis treatment; the rhythm will remain as chaotically irregular as ever under correct dosage, but the pulse difference (the difference in speed between apical and radial counts) will be materially reduced, and in many cases will disappear altogether.

Any statistical study of the results of auricular fibrillation is rendered difficult by the usually long duration of the condition, and also by the fact that it may in some cases be "spasmodic," and occur in attacks of sudden onset, variable duration, and spontaneous disappearance.

Of 133 cases studied recently the sex incidence was equal, but a history of rheumatic origin was obtained in 50 per cent. of females, and in only 30 per cent. of males. The additional frequency of mitral stenosis in women, and, still further, the frequency of fibrillation as the third stage of stenosis, might have been expected to raise the female percentage much higher. The frequency of auricular fibrillation in chronic interstitial nephritis, bronchitis, and as a part of general senile changes could not be directly estimated. The group caused by exophthalmic goitre accounted for only 11 cases, 5 male and 6 female, but they all appear to have responded indifferently to digitalis. Parturition appeared to have been the immediate cause in 3 cases, 1 of which died and 2 responded very badly to

treatment. The importance of this group can hardly be overestimated, more particularly in view of a recent paper by Robinson,[12] in which 13 deaths occurred as the result of parturition in the 16 cases studied. Hemiplegia occurred in 5 cases, and death took place while under treatment in 14 cases, but this cannot represent the real mortality, for most of the patients attended the out-patient clinic, and such are frequently lost sight of, and cannot be traced. Poor results of treatment were obtained in 19 cases, presumably on account of extensive myocardial damage, although this was by no means always demonstrable by any diagnostic method—for example, in the exophthalmic goitre group. No digitalis was given to 14 patients, there being little or no sign of cardiac insufficiency.

Cases of typical auricular fibrillation are frequently reported in which the pulse speed is at, or about, 80 a minute, and, although grossly irregular, yet the pulse rise on effort is not great and the capacity of the patient for work is sufficiently high to allow him to continue fairly laborious occupations. It was in this group that no digitalis was used.

In a small number of cases there is a real difficulty in the administration of any digitalis, because the passive congestion of cardiac failure has itself already caused vomiting. It was thought that if the active principle of the drug were a glucoside, and glucose could be readily absorbed by the rectum, it might be possible to administer a massive dose by that route. The calculated massive dose of the tincture was so administered in two cases, but, although the enema was well retained, no effect upon the pulse speed was observed. This result corresponds well with results obtained by the administration of glucose by the rectum, in which no rise in blood sugar could be found, and it is probable that no absorption takes place.[13]

The treatment of auricular fibrillation by digitalis or its allies does not aim at the correction of the abnormal rhythm, nor at the cure of the causative condition, and no such result is attained. The drug is merely a means, and a very valuable one, for defending the ventricle adequately against the onslaught of auricular stimuli of high frequency, by which means the ventricle is given adequate diastole for reasonable filling and reasonable rest; apart from this, complete cardiac breakdown is both proximate and inevitable.

The principle underlying the quinidine treatment of auricular fibrillation is, of course, entirely different. Here a definite attempt is made to restore the normal cardiac rhythm. This line of treatment is not in the least applicable to patients showing any serious grade of cardiac insufficiency. In the majority of cases a preliminary course of digitalis is necessary to re-establish the circulatory balance, and it is usually believed that the high speed pulse is a definite contraindication to quinidine.

The question of potency in the preparation does not arise, since it is a crystalline substance of high purity, and is readily soluble in acid solution in the same way and much to the same degree as quinine.

The success of the drug turns upon the fact that the continuance of circus movement within the auricular muscle depends upon three factors—the length of the circuit, the impulse conduction time, and the refractory period of the muscle.[14] Any considerable change in one or other of these three factors would terminate the circus movement, and quinidine has been shown to prolong the refractory period of the muscle to an extent sufficient to bring the circus movement to an end. Immediately this occurs the cardiac pacemaker comes into action, normal rhythm is re-established, and the auricular muscle performs a definite systole, thus once more filling the ventricle normally. The fact remains, however, that the primary cause of the state of fibrillation still continues, and that, therefore, relapse is almost inevitable ultimately.

It is generally believed that almost all cases of fibrillation can be forced into normal rhythm, provided quinidine be given over a sufficient length of time and in sufficient concentration, but my own experience is that when large doses are required normal rhythm does not remain long.

The present routine in my service is, in the first place, to reduce the pulse frequency to between 80 and 100 a minute while at rest in bed. Quinidine sulphate is then given in 6-grain doses every two hours for five doses—that is, a maximum of 30 grains. Electro-cardiograms are taken before every dose, and examined, so that, should normal rhythm become re-established, no further quinidine is given that day. The next day the patient is given a mixture containing 1-grain doses of quinidine. This is taken three times a day, and is continued for six to twelve weeks. In my opinion quinidine administration is difficult, and probably should not be attempted, in the absence of electro-cardiographic control. Signs of toxic effect upon the heart are fairly frequent, even with the strictly limited dose detailed above, and although no untoward event has occurred, yet the rise in speed can be very alarming, even when adequate tracings are made every two hours.

In successful cases—those in which normal pacemaker rhythm becomes re-established—the patients themselves very generally recognize the difference, for the continuous palpitation of fibrillation completely disappears. Those that have been regularized more than once can frequently tell the precise moment at which the change from one rhythm to another has occurred.

In spite of the enormous theoretical benefit that should accrue when a fibrillating auricle again resumes a correctly timed and regular contraction, yet a considerable number of regularized auricular fibrillation patients consider themselves no better than they were when under adequate digitalis control. On the other hand, another group of patients will return immediately for further regularization whenever fibrillation recurs, because they recognize very clearly that their capacity for effort is very much higher under pacemaker rhythm than it can ever be during fibrillation.

However brilliant the results of quinidine administration may be in a small proportion of patients, it yet remains obvious that the routine treatment of auricular fibrillation must be carried out with digitalis.

This paper will have attained its object if it helps in any way towards an appreciation of the underlying processes of fibrillation, the objective of digitalis treatment, and, above all, an adequacy of dosage.

REFERENCES.

1 Lewis: *Mechanism and Graphic Registration of the Heart Beat*, third edition, p. 62.
2 Mackenzie: BRITISH MEDICAL JOURNAL, 1905, vol. i, p. 587; *Heart*, 1910, vol. ii, p. 273.
3 Mackenzie: *Diseases of the Heart*, fourth edition, p. 207.
4 Eggleston: *Journ. Amer. Med. Assoc.*, 1920, 74, 733.
5 Robinson: *Amer. Journ. Med. Sci.*, 1920, 159, 121.
6 Pardee: *Journ. Amer. Med. Assoc.*, 1919, 75, 1258.
7 Halsey: *Proc. Soc. Exper. Biol. and Med.*, 1919, 17, 36.
8 Lewis: Op. cit., p. 349.
9 Mackenzie: *Diseases of the Heart*, fourth edition, p. 205.
10 Lewis: Op. cit., p. 351.
11 Cushny: *Journ. Pharm. and Exper. Ther.*, vol. ii, 2, March, 1918.
12 Leyland Robinson: *Lancet*, January 22nd, 1927, p. 170.
13 Porter and Langley: *Lancet*, November 6th, 1926, p. 947.
14 Lewis: Op. cit., chap. 28, p. 323 et seq.

Remarks
ON
THE CAUSATION OF ANGINA PECTORIS:
WITH A REPORT OF THE RESULTS OF SOME EXPERIMENTAL AORTIC LESIONS.

BY

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MANCHESTER.

THE failure of medicine to supply a consistently satisfactory method of treatment for angina pectoris renders necessary the careful investigation of any new procedure for which a claim of cure, or even amelioration of the symptoms, has been advanced. Such is presented by the introduction of surgery into this field, as instanced by the successful operations of Jonnesco, or of Coffey and Brown. On the correctness of the theoretical view of the causal lesion depends the justification for surgical intervention; if it be in the heart or aorta it is beyond the present scope of such procedure, but if the anginal syndrome is attributable to a nerve lesion or depends on the integrity of a nerve path, this line of treatment merits more serious consideration.

Any explanation must take into consideration two essential factors—the neurological element as shown by the operative results, and the cardio-aortic lesions as evidenced by their frequency. Theories that view angina as a neuralgia or paroxysmal neurosis are too nebulous to carry conviction; to disregard the almost constant vascular lesions is to ignore one of the principal features of this condition. On the other hand, to attribute the disease solely to derangement of heart action due to myocardial incoordination or insufficiency is to disregard the very definite neurological factor and the results of surgery. Hence the necessity for some link which will combine these two factors in an interpretation of the disease. With this objective in view, I carried out an experimental investigation the results of which form the basis of the theory of this paper. The details of this have been reported elsewhere;[1] it will suffice here to give a summary of the work.

Following up a line of thought suggested by the work of Todd and Stopford, who have shown that irritation of the peripheral nerves by injury or anatomical abnormalities such as cervical rib produces vascular degeneration in the distribution of the affected nerve, it was decided to apply similar conditions experimentally to the cardio-aortic nerves. For this purpose rabbits were selected and a number of experiments performed in which these nerves in the neck were subjected to chronic irritation, the animals being killed after intervals of several months. It was found that approximately 80 per cent. of the autopsies exhibited inflammatory plaques in the first part of the aorta, either near the valves or near the commencement of the innominate artery; further, the results showed that different stages of aortitis were represented, from early proliferation of the intima to the formation of atheromatous abscesses and the sloughing of the vessel wall in one case and to a diffuse aneurysmal dilatation in another. Generally speaking, the most advanced stages were observed in those animals that had lived the longest after operation. The most frequent lesion was a fairly well defined plaque due to proliferation of the intima and media; there was an increase of cellular elements and hypertrophy of elastic and muscle tissues, and frequently a slight fatty change in the intima. These experiments were controlled by a number of necropsies on rabbits that had been operated on under general anaesthesia with other objects, and had been kept under like conditions. In none of these cases were similar lesions found. In the heart, changes chiefly of a fatty nature were commonly present, but in a few instances there were other degenerative changes. The value of this latter evidence is unfortunately affected by the frequency of fatty degeneration in normal hutch-fed rabbits. In all the *post-mortem* examinations it was noted that the nerves operated on were firmly embedded in a small mass of scar tissue which it was the objective to produce, so as to have a slowly acting irritant increasing in its severity and thus to simulate the human lesions.

Manoudlian has experimentally produced atheromatous plaques in the pulmonary artery and in the abdominal aorta by removal of the nerve supply, whilst the experimental results mentioned above prove that disturbance of the normal conductivity in the cardio-aortic nerves likewise results in pathological lesions, at first slight, but later gross, of the aorta and probably in the heart, though the evidence for the latter is not quite conclusive. Here, then, we have a connecting link between the nervous system and the cardio-aortic lesions. The hypothesis may now be stated: that angina pectoris is a group of symptoms primarily invoked by a nervous lesion, located either in the upper dorsal or lower cervical cord, its associated ganglia or their connexions, and that such lesion secondarily invokes inflammatory and degenerative reactions in the aorta and possibly the heart. These become progressively worse, thereby inducing a vicious cycle of irritation, which on the principles of induction and facilitation of synaptic resistance produces hypersensitivity of the sensorimotor mechanism of the heart, especially the vagal element, commonly resulting in sudden death in severe cases.

From the surgical standpoint the compatibility of this hypothesis with the results obtained is sufficiently obvious. That Jonnesco's operation has gained the most success, judged purely on its effect on the angina, is readily understandable if the lesion is in the area supposed; that Coffey and Brown's operation alleviates but does not cure may likewise be explained, in that the more channels for the conduction of irritant impulses that are eliminated the more likelihood is there of the diminution of the severity of the symptoms; a cure in this way could not, however, be expected.

Some of the corroborative clinical evidence for this hypothesis may be briefly stated.

I.

In a number of cases the angina is accompanied by very definite signs of disturbance of function in the somatic nerves, more especially in the left arm, affecting the motor, sensory, and trophic elements. In the first-named category come paresis of arm or hand muscles, or transitory paralysis, as in the case reported by Bretschneider, or those mentioned by Allbutt, of increased myotatic irritability and exaggeration of reflexes such as the supination and triceps jerks. Under the sensory heading hyperaesthesia, analgesia, and anaesthesia have all been reported. In one most striking case recorded by Gibson all three sensory changes occurred in the left arm, and, what is more noteworthy, in the order which has been described by Stopford as characteristic of the syndrome of nerve compression. Under the last-named group muscle wasting, necrosis of the superficial layers of the dermis in the hand as reported by Salvini, herpetiform irruptions, and even lichen planus have been found in anginal cases. With regard to herpes an especially interesting case which I saw may be briefly mentioned, for it illustrates not only this condition but the occurrence of strongly neuritic prodromal symptoms in a classical case of angina.

A lady, aged 43, in an important executive position attended with much anxiety, complained in 1915 of pain and weakness in the left arm; in 1919 there was severe pain on the same side in the neck, post-occipital region, and arm; about March, 1920, she was troubled with breathlessness, tachycardia, and flatulence; severe pain came on in the fifth and sixth dorsal areas in the left side, followed by an outbreak of herpes. At this time the patient was subjected to increased mental strain and worry. In May of the same year, following a long and tiring motor drive, pain occurred in the left arm, and following dinner that evening she was struck with a sudden sense of constriction in the left side of the chest, followed by an inspiratory gasp, and then a severe stab-like pain in the back of the chest, which was in turn followed by a twisting and tightening sensation over the heart. The patient was doubled forward, unable to move or speak, and obsessed with the fear of death.

II.

In many cases, as discussed by Head, there is a dissociation of the symptoms, crises of peripheral neuritic pains, or of intrathoracic pain and sensations of cardiac oppression alternating with classical attacks of angina. If a nerve lesion be the cause it is conceivable that irritation of a particular group of fibres or cells might occur, occasionally producing either peripheral or visceral symptoms, whereas if all neuritic symptoms be the secondary effects of cardio-aortic disturbance it is difficult to see why at times such a lesion does not manifest itself clinically when the supposed secondary effects, the pain crises in somatic nerves, are very much in evidence.

III.

A nerve lesion located in the region presumed in this theory might be expected to exhibit clinical signs of irritation characteristic of the sympathetic—as, for example, in the vasomotor fibres, on the sweat excretory mechanism, on the ocular path, or, again, on the cardiac acceleratory mechanism. With respect to the latter it must be remembered that the rate of the heart beat must represent the algebraic sum of two antagonistic influences—the sympathetic and the vagus, with the latter normally predominating. The close association in the medulla between the accelerator and inhibitory centres might conceivably result in irritative impulses from the cord or ganglionic lesion stimulating either centre or both to equivalent degree, resulting in acceleration, inhibition, or no change in the rate of the heart beat. The severer the attack, the presumed great degree of irritation, the more probable is the

[1] *Quart. Journ. of Med.*, vol. 19, No. 74, 1926.

spread of the stimulus to both controlling centres, preventing change or even slightly augmenting the vagal inhibition. The same may be said of the vasomotor phenomena; the reciprocal innervation of vascular areas and their intimate adjustment by the principal and subsidiary centres in the medulla and lateral horn of the spinal cord would tend to prevent great extremes of vascular tone. In some cases the great variations in the volume flow of blood through the arms during a crisis, especially in the left, are well shown by plethysmographic tracings. With respect to the other nerve paths excessive sweat excretions and pupillary changes have been reported; these were specially noteworthy in Gibson's case, where the left pupil dilated and the eye became more prominent during an attack; and in the case Allbutt records, where "profuse sweating always preceded the attacks by half an hour." In several instances increased tonicity of the skeletal muscles is recorded; in Hunter's the attacks commenced with rigidity of the facial muscles. Alterations in muscle tone are especially interesting in view of the recent evidence relating this with the nerve terminals of Boeke and Agduhr, which are sympathetic in origin, possessing trophic cells in the sympathetic ganglion of the lateral chain.

IV.

Certain other concomitant symptoms are distinctly favourable to a neurological theory. The sense of cardiac oppression common to anginal attacks is reported by Lauder Brunton as being voluntarily produced in the case of Professor Cernak, who could compress his vagus against a cervical exostosis, when he experienced a sense of "*Beklemmung*" (oppression) in the chest. Several instances of pathological compression are recorded by Skoda, Allbutt, and others. Closely allied to this symptom is the sense of impending dissolution, the angor animi. Its affinity to angina has been noted by writers who support the aortic theory, and the rarity of this psychical phenomenon in other heart conditions, accompanied by lesions just as grave, is a singular fact. Mott records a case of cerebral tumour, accompanied by this feeling; does not this suggest that its anginal incidence is the result of irritation of higher cerebral centres?

Salivation is another symptom frequently encountered. The secretion of an abundant watery saliva is dependent on impulses passing through the chorda tympani, the geniculate ganglion, pars intermedia, to the nucleus of the fasciculus solitarius; there is a connexion thence with the upper part of the glosso-pharyngeal vago-accessory nucleus. The occurrence of salivation is readily intelligible if we suppose a nervous lesion in the lower cervical region sending irritant impulses to the medullary sympathetic and vagal centres. The occurrence of gastric disturbance is likewise to be expected in many cases; just as it has been shown that different sympathetic paths are stimulated so also are the vagal. Again, the relief of gastric distension by the passage of an oesophageal tube, as Verdon practised, would tend to prevent a vicious cycle of increased irritation from that region.

V.

The association of angina with mental irritation is a well known fact; the effects of nerve irritation on non-nervous structures have been described—what might be the effects of irritant impulses from the cerebrum on similar structures or on lower nerve centres?

VI.

Lastly, two cases may be mentioned illustrative of the relation between the nerves and the heart here propounded. In the first, reported by Tenier, a man sustained injury to the cervical spine, spondylo-arthritis developed and coincidently the right heart became dilated, there was arrhythmia and a loud systolic murmur, all of which disappeared as the vertebral trouble subsided. In the second case, reported by Klippel, a man developed cyphoscoliosis, and gradually there came on complete hemiparesis of the left side, with sweating and dilatation of the capillaries, and loss of thermal sense on the right side of the body. During these changes there were four definite attacks of angina distributed over two years.

CONCLUSIONS.

Evidence has been given from the clinical side in which it has been shown that there are reasons for supposing the anginal syndrome to be principally the sum of irritation of several nervous paths, and that certain features indicate direct organic interference with those paths. From experimental pathology it has been found that a primary irritation of the cardio-aortic nerves is capable of exciting in the region they supply pathological lesions identical with those commonly found in angina. Finally, pioneer work in surgery has proved that complete extirpation of the left cardio-aortic sympathetic nerve and connexions may abolish the anginal syndrome.

It is therefore concluded that angina pectoris is probably due to a nervous lesion located in the region of the lower cervical or upper dorsal cord, the associated ganglia or their connexions, exciting secondary pathological changes in the cardio-aortic region; and lastly, that surgical intervention in suitable cases is justifiable from the theoretical standpoint.

BIBLIOGRAPHY.

Agduhr. See Wilson, *Brain*, xliv, 234.
Allbutt: *Angina Pectoris*, vol. ii.
Bretschneider: *Berl. klin. Woch.*, 1911, No. 19.
Daniélopolu: BRITISH MEDICAL JOURNAL, September 27th, 1924.
Gibson: *Brain*, vol. xxviii, 1905, p. 53.
Graham Steell: *Medical Chronicle*, May, 1905.
Jonnesco: *Presse Médicale*, March, 1921, p. 193. V. Martinet: *Les Angines de Poitrine*, p. 67.
Klippel: *Revue Neurologique*, 1908, p. 170.
Lauder Brunton: *Therapeutics of the Circulation*.
Mackenzie: *Angina Pectoris*.
Manouélian: *Annales de l'Institut Pasteur*, T. 27, 1913.
Salvini: *Riforma Medica*, March, 1907, p. 322.
Shaw: *Lancet*, March, 1924; *Quart. Journ. of Med.*, vol. 19, 1926.
Stopford: *Lancet*, April 1st, 1916; and March 30th, 1918.
Tacchi. See Allbutt, *Angina Pectoris*, vol. ii, p. 374.
Tessier. See Osler and Macrae, vol. iv, and *Gaz. Hebd. de Méd. et de Chir.*, 1884.
Todd: *Anatomical Record*, vol. 8, 1914.
Verdon: The Gastric Origin of Angina Pectoris, BRITISH MEDICAL JOURNAL, March 18th, 1911.
Willius: Angina Pectoris, *Arch. Intern. Med.*, February 15th, 1921, 27, No. 2.

CHRONIC RHEUMATISM.*

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By chronic rheumatism is meant the presence of aching pains and stiffness affected by changes of the weather. Excluding the subacute arthritis of young adults and children, with sudden onset, some pyrexia, and, as a rule, an obvious septic focus, and also the relatively rare cases of primary myositis and neuritis, we are left with three clinical types: (1) arthritic, osteo-arthritic, or rheumatoid, dominant; (2) muscular, with latent arthritis, commonly termed fibrositis; (3) neuritic, with latent arthritis, commonly termed neuritis.

Transitions are presented from case to case, and in any given case, so that they may be considered to be different manifestations of one disease. Exception may be taken to this classification—neuritis is regarded as a common disease. The non-arthritic neuritis is eased by rest and made worse by warmth and congestion; in secondary, or arthritic, neuritis the converse holds. Nine of every ten cases diagnosed as neuritis show latent arthritis. The same is true of the muscular type, and in both the most effective treatment is directed to the joints. In an arthritic case examination will frequently show that some of the joints are of the rheumatoid and others of the osteo-arthritic type.

It may occur in young subjects; patients aged 17 and 19 are being treated at present. It is more common in women, probably on account of their larger infectable surface and more rapid endocrine upheavals. A family history of gout or rheumatism is frequent. In the personal history contact with lead, hard work, exposure, poverty diets, humidity, and damp houses appear important, but are inconstant and therefore have a secondary value.

*A paper read before the West Dorset Division.

Basal causes are (*a*) some toxin or toxic substance acting adversely on the joint and its surroundings; (*b*) some factor permitting selective action on these structures.

The Toxic Factor.

This at present is thought to be sepsis. Such a cause is seen in gonorrhoea; a case recently seen, diagnosed as and completely simulating rheumatoid arthritis, very rapidly cleared up when the infection was eliminated. In Malta fever arthritis and spondylitis very similar to those of rheumatism occur[1] and disappear when the sepsis is conquered. Experimentally 58 per cent. of rabbits infected with streptococci from various sources showed a varying type of arthritis.[2]

The facts that little sepsis may be found at the examination and that removal of sepsis is often disappointing, have been taken as evidence against its importance. It may be that the sepsis has done its work. Cases seldom recover if sepsis is not removed; when a patient fails to make good progress it is well to look again for a missed focus. Evidence for the presence of sepsis when none is apparent is elicited by an Arneth count of the blood.

Septic foci are most commonly found in the mouth, especially dental. The area of the teeth sockets is estimated to be about 20 square inches. In many of the patients a large proportion of this is a suppurating surface. Judging from the great pressure required to squeeze pus from a socket, it is not wise to expect drainage to be perfect, and even if it were, we cannot say that swallowed pus is innocuous. Apical infection may be present without much periodontitis, and may be missed by *x* rays if there is no rarefying osteitis.[3] In chronic rheumatism a suspicious tooth should not be given the benefit of the doubt. The nose and accessory sinuses are not uncommonly infected. The genito-urinary system is frequently involved, and pyelocystitis, endocervicitis, etc., with leucorrhoea in women and prostatitis in men, are common. Cholecystitis is not uncommon. Gastro-enteric infection occurs in many cases. A large proportion show hypochlorhydria or achlorhydria and infection of the small bowel. The opposite condition, "hyperchlorhydria" from faulty pyloric action, with subsequent hurried gastric evacuation, is also common. From these and reflex hepatic causes dyspepsia is almost constant in elderly patients, and extracted molars must be replaced or the dyspepsia is aggravated. Evidence of the bowel infection is to be obtained from bacteriological examination of the stools and from the amount of indican and urobilin in the urine. Unfortunately multiple foci are the rule rather than the exception.

The Selective Mechanism.

Here we are dealing with theories as well as facts.

The work of Rosenow[3] showing that an organism from a certain focus will usually attack that same focus in the experimental animal is suggestive. Probably the affinity is chemical, like that of tetanus toxin for the nervous system, and the toxin depresses joint defence and regeneration. The functional resemblance of the periodontal and synovial membrane is significant. There may be local anaphylaxis; arthritis has been produced experimentally in this way.[4] The hereditary influence is so marked that the possibility of functionally hypoplastic joints is raised. Injury is occasionally a localizing factor.

A factor of apparent importance, not previously noted, as far as my knowledge goes, is the occurrence of some vasomotor disturbance preceding the onset of the arthritis. Though proof is lacking, it may well be that variations in the nutrition of the joint and lowering of defence and repair are thus produced. The frequency of the condition at the menopause and the occurrence of painful cramps in the neuritic type are significant. In fully 50 per cent. of the total cases vaso-neuroses, chiefly of the Raynaud type, are found. The patients have suffered from "dead fingers" in cold weather. Less commonly there has been local asphyxia. Three of my patients had been diagnosed as cases of true Raynaud's disease some years previously. In two cases the opposite condition, a degree of erythromelalgia followed by coldness, was found. As these symptoms usually disappear before the onset of the rheumatism their occurrence is not often volunteered.

As adjuvants to these two basal causes there are probably more secondary causes than are yet recognized. Heat loss by damp appears to be important. Thyroid defect, for which evidence is obtained from blood films—relative lymphocytosis—is common.

The importance of hepatic defect is difficult to assess; it is found in a large proportion of cases if all the functions of the liver are tested. Whether defect is primary or secondary cannot be determined, but recognition of its presence and modification of the diet to meet the defect appear to help. The occurrence of rheumatic pains in hepatitis led me to suspect an hepatic factor in rheumatism.

In this connexion the metabolism of sulphur, a drug widely used in rheumatism, is of interest. Meyer Bisch first recommended sulphur injections, and claimed good results.[5] A different explanation from the one he gave has recently become possible. Cawadias noted that sulphur excretion was abnormally high in these cases,[6] and I have confirmed both this and the fact that this excretion is markedly reduced after sulphur injections. This sulphur loss would appear to operate by leading to depletion of hepatic glycogen,[7] which renders the liver less able to detoxicate toxic substances carried to it in the portal and systemic blood. Secondly, the amount of hepatic glycogen has an important bearing on carbohydrate metabolism, which is found to be abnormal in a large proportion of these cases; a low carbohydrate tolerance associated with hyperglycaemia is found. In all the cases tested I found that the tolerance increased and the glycaemia was reduced after sulphur injections. A sulphur compound, glutathione, is indispensable for metabolism; with the sulphur wastage found in rheumatism it is possible that there is a diminution of this substance—for all the treatments of use will be seen generally to stimulate metabolism.

Examination of the Joints.

The *x*-ray picture shows advanced stages only. Limitation of movement and pain are important in all, but especially in the vertebral joints, which are frequently diseased. Tenderness of the periarticular structures is found in the superficial joints, and is especially marked in the seldom examined sacro-iliac joints. Tender points around a suspected joint often throw light on an obscure pain and raise suspicion of active arthritis. The common point for the shoulder-joint is one of the supraclavicular nerves emerging at the lower border of the trapezius about 1½ inches from the outer end of the spine of the scapula. Other tender joint points will be readily learned by practice. Careful palpation of a joint on passive movement will reveal moderate and coarse friction; auscultation during passive movement, after practice enables elimination of muscle sounds, reveals finer friction.

Treatment.

Gout, gonorrhoea, syphilis, and tuberculosis must be excluded. The latter is usually easy, for, if carefully examined, most cases of rheumatism are found to be polyarticular, whereas tubercle usually affects one joint only.

Sepsis must be removed. Where surgical removal is not possible, antiseptic lavage may help, as in nose and vagina. For pyelo-cystitis hexamine with acid in small doses, for cholecystitis hexamine with alkali in large doses may be tried. Alimentary sepsis is best combated by diet. A high carbohydrate diet, consisting mainly of fruit and vegetables and cereals, with a strictly moderate amount of red or white meat, increases the acidity of the bowel contents, and the growth of streptococci is reduced. This can be observed from the study of faecal films. Lactic or *acidophilus* cultures assist. This diet also aids by reducing constipation and possible toxic absorption, as the greater bulk of indigestible debris leads to more frequent evacuation.

Fats should be cut down at first, especially where hepatic defect is at all marked, for the metabolism of fats would appear to make too large a demand on hepatic glycogen. The withdrawal of the fats must be compensated by an increase of carbohydrates. The exception to this dietary is the small group of cases following poverty diets; in them a rich diet is more efficacious.

The use of wines and spirits is a difficult matter to settle; the experience of the patient appears to be the

best guide. Some take cider without harm, others of the same type find that pain is increased. If it can be taken without increase of pain, a little sound wine appears to help digestion and nutrition.

Attention to the secretory activity of the stomach is usually necessary, but must vary with the anomaly found. The flatulent, vague dyspepsia of the hepatic improves with the liver-sparing diet. Where there is achlorhydria or marked hypochlorhydria a mixture of hydrochloric and phosphoric acids with food should be given; for complete achlorhydria in an average-sized adult, 20 minims, rapidly increased to 1 drachm, of each in a tumbler of water flavoured with sugar and orange juice, should be sipped with each full meal. In the rapid emptying type belladonna before, or a little olive oil with, meals is helpful.

Drug Treatment.

Laxatives are frequently needed. The diet, supplemented by agar-fig and prune jellies, helps. Abdominal massage along the colon, applied by means of a weighted croquet ball, is useful. Sulphur confection (though sulphur by the mouth has no action on carbohydrate metabolism), podophyllin, calomel, and blue pill all are useful in stimulating bile flow.

Sedatives are often needed, especially at the menopause, when bromides are indicated. Salicylates associated with podophyllin, and administered at the beginning of the meal, often appear to ease the pains of rheumatism; unless given at this time they may intensify the dyspepsia. Phosphorus, given as phosphoric acid when the gastric acidity permits, has a sedative action; it may also be given as phosphorus pills in 1/100 grain doses thrice daily, but not for too long, as it has a marked toxic action on the liver. The same is true of phenacetin.

Thyroid extract often helps, but should be reserved for the cases which show increasing adiposity, constipation, and a relative lymphocytosis. It acts as a stimulus to metabolism and indirectly increases repair and immunity processes. The thyroid-manganese compound would appear to act in this way, though the combination of the two probably reduces the activity of both—as thyroid is often given in far too large doses, the reduction may well account for the good results reported. Manganese acts by increasing immunity responses, especially antibody formation.[8] It may be given by injection of the colloid, or as permanganate in lavages and in vaginal douches in cases presenting leucorrhœa. The value of iodine is well recognized; it appears to give the best results in the neuritic type, especially in younger subjects. It may be given as the French tincture, without iodide, 5 to 15 drops in milk, after food. Caffeine tri-iodide in freshly made pills of 2½ grains may be used; the caffeine may act as a vasodilator. Iodine may also be given as lipiodol injected deeply once weekly in doses of 7 minims, increasing to 30; many patients improve rapidly, but the effects do not often last long. There is little reaction to lipiodol. If it is well warmed and poured into the barrel of the syringe it is easy to inject. Severe old-standing cases of the arthritic type do not respond to iodine.

Protein Therapy.

Vaccines should be reserved for the recent cases in younger subjects with marked septic foci. Vaccines may be combined with manganese, for the reason given above. In the old-standing cases non-specific protein therapy gives better results. In cases of this kind, where pain, rather than limitation of movement, is the complaint, good results frequently follow intramuscular injections of foreign protein—caseosan, novoprotein, or any of the many kinds on the market. The larger the dose and the greater the reaction, the better the result.

In the rheumatoid type intravenous protein treatment affords a large proportion of rapid results, and should be given at the outset. Any vaccine, but preferably an old one consisting of *B. coli* or the *typhosus* group, may be used. It is well to commence with a dose of 50 million, and increase or diminish as needed to obtain pyrexia of about 101°. As the course proceeds an increase of the dose is usually necessary. The reaction is unpleasant, but the patient may be consoled by being told that the result is proportional to the degree of reaction. Salicylates are useful in the control of the reaction.

Sulphur Treatment.

Sulphur injections are of special help in the old-standing cases of the osteo-arthritic type with pain and marked limitation of movement. It may give good results in other types, however. The treatment should not be used in feeble or very querulous patients. If pain is not marked it should only be given if there is an earnest desire for increase of motility.

The injection should be given deeply into the trunk muscles or thigh. The best form is the sulpholein of Egger of Buda, or a saturated solution of sulphur in poppy-seed oil, or any non-mineral thin oil, may be made and sterilized by heat. The initial dose should be about 6 minims, and the early reactions, usually severe, noted. Three days after the reaction has passed should be allowed before repeating injection, and, as reaction permits, the amount should be rapidly increased until the patient is receiving from 30 to 45 minims. I usually give ten injections and repeat after an interval of three months.

The reaction is alarming. The site often appears to be on the point of suppuration, but only once have I seen this follow, in a rather dirty out-patient. There is a good deal of pain locally, and increase of pain in the joints. There is also fever and sometimes vomiting. The patient must be warned and should be kept in bed until it has passed. Some patients react little. The days following, before the subsequent injection, are often passed with diminished pain, even in the early days of the course. Most of the patients state that they lose their night pains and find that motility is increased. A sceptical house-physician was convinced that the treatment was a good one, because the patients were so constant in attendance for a remedy which produced such a reaction. Sometimes the sum total of pain is increased until the course is finished, but this is the exception. One course is seldom sufficient.

When the starting and night pains are lessened the methods presently to be described for restoring motility should be begun; before this the tone of the muscles may be improved by massage. The method has yielded a fair number of moderate, and some striking, successes, but the choice of patients is not easy. Colloidal sulphur is too weak to give constant results. At present I am trying a form of sulphur paste much stronger than the oily solution; with it the reaction is less, proportionately to the amount of sulphur injected, but at present it is not certain that the results are better. I have to thank Mr. A. L. Taylor and the dispensing staff of the Bristol Royal Infirmary for much help in the preparation of these compounds.

Physico-Therapeutics.

Ultra-violet radiation, if judiciously applied, stimulates metabolism and immunity processes, and appears to have some sedative action. Its value seems to be greatest in the muscular and neuritic types, but is difficult to assess, for the psychic element is considerable at present.

Diathermy is especially useful for deep joints and active arthritis. The heat produced by the passage of the current causes increased vascularity, analgesia, and the hope of better regeneration; in addition, the heat is sufficient to destroy many micro-organisms. In muscular types of long standing it should be applied cautiously, as there appears to be a risk of increasing fibrosis. Some encouraging results are claimed from pelvic diathermy,[9] which is thought to stimulate prostatic and ovarian secretions. Whether it really has this action or whether the result is due to antiseptic action is uncertain, for, in the cases with marked leucorrhœa, very good results often follow hot permanganate douchings, if applied in the dorsal position and a large amount of fluid used.

Ionization acts in the same way as diathermy, but the action is less powerful; it is of most use for superficial joints. A fair number of my patients ionize themselves after a little training, and obtain a sufficient number of treatments without a very long bill. The ions used have little importance, but sodium thiosulphate or sulphide for

the negative pole, and quinine hydrochloride for the positive pole, give good results. Sulphides are very irritant, and many skins will not stand them. After diathermy or ionization passive and active movements should be practised.

Massage is mainly of value for restoring muscle tone before more active methods can be applied. Passive and active movements at first, later followed by gymnastics, should not be practised until the starting pains of active arthritis have disappeared. Where there is much limitation of movement the joint should be carefully broken down under anaesthesia; it should be remembered that the bones of old-standing cases are fragile. Useful local treatments are the application of irritant liniments, and turpentine with capsicum. Iodine applied as frequently as the skin will stand without vesication is of value chiefly in neuritic types of young adults. A well applied Scotch dressing is often very soothing for superficial joints; it is a remedy much less widely used than it deserves; unfortunately only about 80 per cent. of skins will stand it without vesication.

Treatment of arthritics is best started in the spring or summer; in winter changes of weather cause confusion. If possible, palliative treatment and residence in a more equable climate should be considered until the winter has passed.

The value of spa treatment is difficult to estimate; there appears to be little proof that the metabolism and infections of these patients are modified by any natural mineral water, apart from the flushing, which can be practised at home. The successes of spa treatment may well be due to the more energetic treatment given. As a mental stimulant I advise Vichy water to those patients who have a belief in the efficacy of mineral waters.

REFERENCES.

[1] Roger, H.: *Presse Méd.*, 1926, 59, p. 929. [2] Haden, R. L.: *Amer. Journ. Med. Sci.*, 1926, clxxii, 6, p. 885. [3] Rosenow, E. C.: *Surg., Gynecol. and Obstet.*, 1921, 33, 19; and *Journ. Infec. Dis.*, 1923, 33, 3, 248; also cf. [2]. [4] Danysz, M.: *Origine, évolution et traitement des maladies chroniques non contagieuse*, Ballière et fils, 1920. [5] Meyer Bisch, R.: *Klin. Woch.*, 1922, 12, 575. [6] Cawadias, A.: BRITISH MEDICAL JOURNAL, 1925, ii, 602. [7] Bürgi, R., and Gordonoff, T.: *Klin. Woch.*, 1926, 11, 466; and Campanacci, D., and Balducci, R.: Ibid., 1926, 46, 2166. [8] Pico, C. E.: *Compt. rend. Soc. de Biol.*, 1924, 91, 1049. [9] Cumberbatch, E. P., and Robinson, C. A.: BRITISH MEDICAL JOURNAL, 1926, i, 612.

CHRONIC FIBROUS EPIPLOITIS.*

BY

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I WISH to record briefly a pathological condition which I have never previously seen and about which I cannot find anything in surgical or pathological literature.

An ex-soldier, aged 54, was admitted to Mercer's Hospital on February 18th, 1927, suffering from intestinal obstruction, which was temporarily relieved by enemata. He gave the following history. In 1916, while serving in Gallipoli, he contracted an illness which was characterized by severe colicky pains in the abdomen, diarrhoea, and the passage of blood. He says that he was told that he was suffering from dysentery and that this diagnosis was written on his chart. It is not easy to reconcile this diagnosis with his further statement that he was "operated upon for the cure of haemorrhoids" about a month after the onset of his illness. From that time until February, 1926, his bowels remained free, with occasional attacks of diarrhoea, but he does not think that he passed any blood. From February, 1926, he became constipated and took salts constantly. If he allowed the constipation to persist for a few days he suffered from severe griping pains and could feel "hard lumps" in his abdomen. On six occasions during the past twelve months he developed symptoms of subacute obstruction and was treated, in various hospitals, by enemata as he always avoided operation. He thinks that he has lost weight during the past three months.

The patient is a thin, pale, but hardy looking man. When I saw him he was in pain and it was quite easy to see two prominent swellings in an otherwise flat abdomen. One swelling was in the region of the caecum and the other was almost symmetrically placed on the left side. These swellings were resonant on percussion and almost disappeared, with much gurgling, when massaged. Examination of the rectum gave no help, neither did an *x*-ray examination. The urine was normal and the blood was negative to the Wassermann test.

He was treated by dieting, purgatives, and enemata until March 11th, when I opened the abdomen by a right paramedian incision. When the peritoneal cavity was exposed no intestines were visible; nothing could be seen except a smooth pearl-white membrane with slight prominences where the intestinal swellings had been felt during clinical examination. The membrane was continuous above with the peritoneum covering the stomach, was adherent to the parietal peritoneum on either side outside the colon, and was attached below along the lines of Poupart's ligament and in front of the bladder. At no point was there any adhesion to the anterior abdominal wall, the peritoneum covering which appeared normal in colour and texture. There was no free fluid. The distribution of the membrane was as if a towel had been laid over the intestines and carefully glued at the bottom and sides to the parietal peritoneum.

An opening was made through the membrane, in the mid-line, when it was found to be adherent to the intestines, but separable from them by careful dissection and sponging. It soon became evident that there were three strong fibrous bands incorporated in the membrane: one was adherent deep down in the pelvis and constricted the upper part of the rectum, one compressed the lower part of the descending colon, and the third constricted the ascending colon, just beyond the caecum. When these bands were divided gas could felt gurgling through the intestines. The membrane was now removed in sections as far as the greater curvature of the stomach, over which viscus the peritoneum appeared whiter and felt thicker than normal. The intestines, when freed from the membrane, were found to be universally adherent to one another, but could be separated by sponging just as an adherent prepuce, in a child, can be separated from the glans. Here and there drops of blood oozed from the surface of the intestines and mesenteries, but on the whole the peritoneum appeared intact. No trace of anything like omentum was found.

I cannot give a description of the peritoneum covering the liver and spleen nor a detailed description of the stomach, as the operation lasted so long that I did not feel justified in enlarging the incision for the purpose of exploration. The appendix, which was very much kinked and bound down to the caecum, was removed and the abdomen was closed.

The patient made an uneventful recovery; he is now free from discomfort of any kind and does not need aperients.

Several portions of the membrane were sent to the pathological laboratory in Trinity College, and Dr. John Lait made the following report:

"On microscopical examination these fibrous-looking membranes are found to be composed on the surface of dense hyaline fibrous tissue, while in the deeper layers the tissue is softer and contains many vessels, similar to those found in a late granulation tissue. There is no covering layer of cells on the surface. It is possible that these membranes may be the result of a fibrinous exudate organized into dense fibrous tissue, or else they may represent a chronic inflammatory condition of the omentum, but there is no histological evidence to show that the tissue is omentum."

The portions of membrane were about the thickness of a sheet of Morocco leather.

I have not seen a description of anything similar to the above condition, so I have provisionally named it "chronic fibrous epiploitis." My reasons for thinking that the tissue was originally omentum are the position in which it was found and the fact that no other structure was discovered to represent the omentum.

The conditions most closely allied to this are the thickening of the capsule of the liver or spleen which is sometimes found at a *post-mortem* examination, and the thickening of serous membranes which occurs in those rare cases called polyserositis.

There is no evidence that the condition was tuberculous in origin, and the Wassermann test negatives syphilis. It is hardly conceivable that the condition arose from an acute or subacute inflammation, due to dysenteric or other forms of ulceration, as there were no adhesions to the anterior abdominal wall and there was no fluid present which might prevent such adhesions.

The only conclusion which can be come to is that the process was very gradual and may possibly have arisen in a similar manner to the gauze-like membrane, known as Jackson's membrane, which is so commonly found over the ascending colon.

* Communicated to the Section of Surgery of the Royal Academy of Medicine in Ireland on May 13th, 1927. A report of the meeting will be found at page 1059.

THE DIFFERENTIAL DIAGNOSIS OF JAUNDICE.*

BY

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I PREFACE my remarks with a reference to the theory of Aschoff and McNee concerning bile formation.

Bilirubin is formed from the haemoglobin of the blood stream by the reticulo-endothelial system; it is then passed on by the polygonal cells of the liver to the bile capillaries. That its passage through the polygonal cells alters its chemical characteristics forms the fundamental basis of the van den Bergh test, the interpretation of which may be expressed thus: Jaundice arising from obstruction of the bile duct gives a direct or immediate reaction. Jaundice produced by over-production of bilirubin, in excess of that which can be dealt with by the polygonal cells, gives a delayed or indirect reaction; while a biphasic reaction is produced when obstruction in the ducts is associated with dysfunction of the polygonal cells.

The following classification of jaundice has been suggested by McNee:

1. Obstructive hepatic, producing a direct diazo reaction.
2. Haemolytic, giving the indirect reaction. This is seen in pernicious anaemia, acholuric jaundice, and Banti's disease.
3. Toxic and infective, giving rise to the biphasic response.

Age of the Patient.—I need not dwell on the well known causes of jaundice in infancy, but I would draw attention to two clinical features in childhood: (1) Multilobular or periportal cirrhosis, often attributed to the administration of spirits by ignorant mothers, has its origin in the spleen, slowly spreading to the liver along the portal vein as a pylephlebitis. The picture is that of Banti's disease and has probably no connexion with alcohol. (2) Enlargement of the spleen with jaundice in children under 4 months is almost always, in the absence of acute infections, due to congenital syphilis. An obscure case during childhood always calls for the Wassermann test. In children and young adults the commonest form of jaundice is "catarrhal." Hanot's biliary cirrhosis, a rare disease associated with great enlargement of both liver and spleen, pyrexia, leucocytosis, and eventually marked jaundice, occurs in young adults and children. After 40 years of age cancer must always be suspected.

Sex.—Jaundice in women is frequently caused by gall stones; its development during pregnancy will arouse a suspicion of acute yellow atrophy. It has repeatedly been stated that visceroptosis, so common in women, produces jaundice by kinking of the common bile duct when the duodenum, liver, or kidney is displaced downwards, but it is equally probable that a cholangitis arises from the accompanying intestinal stasis. Alcoholic cirrhosis is common in men, as also is syphilis. Here let me refer to those cases of toxic jaundice following intensive anti-syphilitic treatment by arsenical compounds, and to recent advances in pathology dealing with the detection, by the van den Bergh reaction, of latent jaundice following injections of novarsenobillon, with a view to determining the advisability of further doses and the prevention of arsenical poisoning.

Occupation and Residence Abroad.—Workers coming into contact with tetrachlorethane, phosphorus, etc., are liable to poisoning, and it cannot be denied that hepatic cirrhosis is fairly common among those in the liquor trade. The possibility of the development of hydatid disease in the liver, acute malaria, tropical abscess from amoebic dysentery, and cirrhosis, both from malaria and *Bilharzia japonicum*, must be borne in mind when dealing with patients from abroad.

Family History.—This is of particular importance in excluding familial or hereditary icterus, one variety being found in the newly born, fatal in character, affecting successive infants whose parents are in good health except that the mother during pregnancy suffers not infrequently from jaundice. Another variety is termed "acholuric," inasmuch as bile cannot be detected in the urine; the jaundice is haemolytic. This is the only disease in which the red cells are constantly found to be abnormally fragile, commencing to haemolyse at 0.6 per cent. saline. An almost identical condition is observed in the sporadic variety developing later in life, frequently pyrexial, and apt to be confused with pernicious anaemia, owing to the similar blood picture, but the leucocytosis present is in direct contrast to pernicious anaemia.

The Course of the Disease.

A sudden onset is commonly due to gall stones and catarrhal jaundice, but it may be equally sudden in severe intoxications and infections.

When jaundice is progressive, cancer of the head of the pancreas, of the liver, gall bladder, or bile ducts, should be suspected, and in all doubtful cases I need hardly insist on the importance of carrying out a rectal examination to negative the presence of primary rectal carcinoma giving rise to no symptoms locally. Sometimes chronic pancreatitis with associated inflammation of the bile ducts, very rarely a pancreatic calculus impacted at the junction of the pancreatic and bile ducts, or occasionally a biliary cirrhosis may be the cause of chronic jaundice.

Recurrent attacks are commonly the result of gall stones, especially the "ball-valve" variety; rarely they may be due to chronic pancreatitis or visceroptosis.

The Symptoms.

Important features are:

1. *Pain*—its constancy suggesting growth, its recurrent nature pointing to cholelithiasis; it is absent in catarrhal jaundice and the various cirrhoses.

2. The conspicuous *absence* of the usual concomitant symptoms in acholuric jaundice—for example, normal stools, absence of bile in the urine apart from complications.

3. The occurrence of *rigors* may prove of help, suggesting one of three diseases: (*a*) an infective cholangitis; (*b*) an infective suppurative pylephlebitis, often associated with abscess formation in connexion with the appendix; (*c*) hepatic abscess. A rigor does not exclude an ordinary attack of gall stone, or acute infections such as pneumonia and Weil's disease.

4. *Haematemesis* points to cirrhosis of the liver, particularly alcoholic and splenomegalic (Banti's disease); and here a word concerning haemorrhage associated with jaundice might be useful. Owing to increased fragility of the capillaries, haemorrhages are likely to occur in any jaundiced patient, a point of interest to surgeons; bruising may also result and have an important bearing in medico-legal cases, being mistaken for evidence of violence.

5. A distinguishing feature between obstructive and non-obstructive forms is that in obstruction to the larger bile ducts the *stools* become clay or greenish-white in colour.

6. The patient may give a clue to the initial diagnosis by referring to the high colour of his *urine*; in all cases of jaundice the urine should be examined for bile pigment, as it is found here before it is observed in the conjunctiva, and hence some time before the skin is affected.

It is interesting to recall that during the war it was a practice among French and Italian soldiers to swallow small quantities of picric acid every week or fortnight in an endeavour to produce a yellow colour of the skin and sclerotics, in the hope that it might be mistaken for jaundice and thus procure a transfer to the sick list. The skin in such cases is of a more coppery hue, picric acid is present in the urine, and the van den Bergh test is negative.

It is on record that concussion has given rise to jaundice by setting up a sudden spasm of the bile ducts; and I have known shock to produce a jaundiced condition, attributed to the gastric and duodenal catarrh which frequently accompanies severe mental emotion.

* Read at a meeting of the Staffordshire Branch of the British Medical Association, November, 1926.

The Physical Signs.

The Condition of the Liver.—A neoplasm is usually associated with a much enlarged and irregular shaped liver, but jaundice may be late in its onset and even not apparent throughout the illness. Syphilis may produce an irregular enlargement which is not so great as that caused by the presence of a growth, and jaundice is not infrequently absent. It has been commonly stated that the liver is diminished in size in alcoholic cirrhosis, and though this is true in a certain proportion of late cases, the majority exhibit a distinct enlargement, and it is then either fairly soft, owing to chronic congestion together with an early cirrhosis without splenic enlargement, or it is hard and even hobnailed and associated with a firm big spleen. A sudden increase in the consumption of alcohol will cause also a sudden increase in size of an already shrunken fibrosed liver which will diminish again under treatment. It may be a most difficult matter to diagnose between an ordinary cirrhosis and a "cirrhosis carcinomatosis," the latter being a diffuse carcinoma spreading throughout a cirrhotic liver. An interesting fact is that 25 per cent. of cases of primary carcinoma of the liver occur in alcoholic cirrhosis, but that such livers are rarely the seat of secondary growths. *Diminution* in the size of the liver is a feature of acute and subacute yellow atrophy, but here the jaundice is marked, whereas it is a late clinical sign of portal cirrhosis.

Ascites is in favour of a diagnosis of new growth. When met with in alcoholic cirrhosis it is regarded as a sign of advanced disease or the result of concomitant peritonitis. Both ascites and jaundice are induced when the portal vein and the common bile duct become compressed at the hilus of the liver from local enlargement of the lymphatic glands. A similar occlusion, though rare, has been found in a significant number of *post-mortem* examinations; it was due to aneurysm of the hepatic artery, resulting from a septic embolus in cases of ulcerative endocarditis. A combination of ascites and slight jaundice is observed in cases of heart failure with hepatic congestion, the cyanosis and icterus producing together an almost typical dusky-green colour.

The Gall Bladder and Pancreas.—When the gall bladder is enlarged it is due to some obstruction of the cystic duct or common bile duct, or to a growth of the gall bladder itself. A cystic duct obstruction does not *per se* lead to jaundice. Courvoisier's famous law is of great value provided that the two fallacies associated therewith are recalled. First, that the gall bladder would not enlarge if previously contracted by the presence of calculi, in spite of a cancerous pancreas; and secondly, that the gall bladder may not suffer fibrosis although stones become impacted in the common duct. The commonest growth producing enlargement of the gall bladder is carcinoma of the head of the pancreas. Radiographic evidence is of value in the detection of gall stones containing calcium salts. In cholecystography we now possess a fresh method in diagnosis; it demonstrates anatomico-pathological changes in the gall bladder, including functional activity, while gall stones that cast no shadows on the radiogram may be shown up as negative shadows on the cholecystogram.

Pathological Examinations.

Of the pathological examinations necessary to confirm a tentative diagnosis the most important is that of the blood. In addition to the van den Bergh test, the Wassermann reaction, and the fragility test of the red cells, there is the blood picture of pernicious anaemia to be remembered, that of Banti's disease with its leucopenia and relative lymphocytosis, and the differential counts in the various infections. Similarly may we diagnose the blood diseases producing jaundice from pressure of enlarged glands.

A high proportion of eosinophile cells indicates a parasitic invasion, especially hydatid, where the diagnosis may be strengthened by carrying out the complement fixation and the precipitin reactions of the patient's blood serum. I have seen one such count in which the eosinophile cells reached the enormous proportion of 70 per cent. of the white cells.

An examination for micro-organisms, or a blood culture, will on occasions be found essential in infections such as malaria, Weil's disease, enteric fever, yellow fever, leptospirosis icterohaemorrhagica, and septicaemic conditions. Weil's disease is now supposed to be due to *Bacillus proteus fluorescens*, and haemorrhagic jaundice to a leptospira which has been found not only in rat's blood, but also in the mud-slime of mines.

Amoebae or their ova in the stools will give sufficient evidence for a diagnosis of amoebic dysentery with tropical abscess. The chief tests for pancreatitis combine an examination of the stools for an excess of unsplit fat, of the urine for diastase and glucose, and the mydriasis test by adrenaline.

I must refer also to the condition of the bile and other duodenal contents after extraction by means of Einhorn's tube. We can learn therefrom the presence or absence of pus cells, of micro-organisms (such as *B. typhosus* in carriers), and pancreatic ferments; and would it be saying too much to hope that small roundworms may be the cause of obstruction of the common bile duct? No case of apparent catarrhal jaundice with a tendency to chronicity should be diagnosed as such until, after search for the ova in the stools, or after employment of the therapeutic test, one can conscientiously exclude infestation by *Ascaris lumbricoides*. An examination of the ascitic fluid reveals its character, whether it be inflammatory, malignant, or transudatory.

Finally I will allude to the tests of hepatic efficiency—numerous and at present somewhat unconvincing, but nevertheless holding a lesser place as an adjuvant in diagnosis.

THE CARDIO-THORACIC INDEX:

*A CLINICAL METHOD OF EXPRESSING THE SIZE OF THE HEART.**

BY

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THE size of the heart is always of great importance, not only in the examination of individuals suffering from cardiac disease, but also in healthy people when giving an opinion for insurance companies or in compensation claims, and the position of the cardiac impulse, or, as it is rather loosely called, the "apex beat," is generally taken as an indication of the heart's size.

The cardiac impulse is a most valuable physical sign of the heart's action, and its position gives reliable evidence of any change in the situation of the left ventricle, whether this is due to displacement of the whole heart or to hypertrophy and enlargement of this chamber; but it cannot give direct evidence of any cardiac enlargement as a whole.

Accurate determination of the actual size of the heart in any individual is a somewhat lengthy and laborious process, and necessitates very careful percussion combined with x-ray photography; it can hardly be looked upon as a clinical method, but sufficiently accurate information can be obtained by the method to be described.

The accepted definition of the cardiac impulse is the maximum thrust of the left ventricle against the anterior chest wall; this is usually stated to be three and a half to four inches from the mid-sternal line, or, alternatively, half an inch to three-quarters inside the nipple line.

It is quite obvious that the first of these statements can only refer to a certain group of individuals, since the cardiac impulse in a baby of 12 months will bear quite a different relation to the mid-sternal line from that of a child of 12 years, which, again, will be different from that of a man of 50.

The second statement, which uses the nipple line as a standard, is even more fallacious, since the nipple varies so much in position at different ages under different conditions that it is really only of use in dealing with adult men.

* Read to the Sheffield Medico-Chirurgical Society, March, 1926.

Some simple way of recording the size of the heart would be advantageous, and I have attempted to find such a method. Some years ago it occurred to me that it might be possible to express the size of the heart as a fraction which would be a constant factor for all ages if the distance of the cardiac impulse from mid-sternum were put as the numerator of a fraction the denominator of which was the circumference of the chest at the level of the impulse. I made a number of measurements, but it was soon obvious that this factor was only a statement of the distance of the cardiac impulse from the middle line. It then appeared possible that an estimation of the deep cardiac dullness expressed as a linear distance from the extreme limit of the right border of the heart to the cardiac impulse, and used as the numerator of the fraction, with the circumference of the chest used as the denominator, might give a constant for all ages. But before any conclusions could be reached, it was essential to be sure that the right border of the heart could be determined with sufficient accuracy by clinical percussion to be used in such a measurement. The necessity for this step is evidenced by the frequently expressed opinion that percussion of the right cardiac border is largely a matter of imagination. If due care is observed it is possible to define the right border of the heart with a considerable degree of accuracy, as may be seen in the accompanying drawings (Fig. 1).

The method adopted was to percuss out the borders of the heart with closed eyes and to mark the surface of the chest

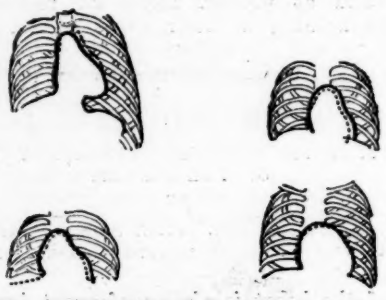

FIG. 1.—Delineation of the cardiac margin.

with a skin pencil; when the percussion was completed, a thin lead wire was run round the pencil marks and kept in position by strips of strapping. An *x*-ray photograph was then taken with the tube carefully focused and centred at a sufficient distance to give parallel rays; the shadow produced by the heart can then be compared with the much denser shadow of the lead wire. I think it will be seen from Fig. 1 that it is possible to delineate the heart's borders with a fair degree of accuracy. Having decided that clinical percussion if carefully and honestly carried out could be relied upon, a number of measurements have been recorded. It appears fairly clear that by expressing the linear cardiac dullness as the numerator and the circumference of the chest as the denominator a fraction is obtained which at any age or sex is almost a constant; it approximates to 1/6, and for the sake of reference I have called this the "cardio-thoracic index." A more accurate numerator would be the distance of the right border of the heart to the impulse, measured by callipers rather than a tape, but the latter is generally available, and the error is a very slight one.

The actual indices obtained by the above method are seen in the accompanying tables, the first of which represents measurements of what may be considered normal conditions. In both tables only the denominator of the fraction is given, for the sake of simplicity. Here it will be noted that there is only one group in which the fraction is in any way strikingly below 1/6, and this in women between 20 and 40 years of age. It is due to the development of the breasts in this period of life; but even including these low fractions the average for any age of either sex is 1/6.3.

Table II shows a few measurements of abnormal conditions, and I need not detail them, as they are depicted here with the accompanying pathological condition.

TABLE I.—*Normal Cardio-Thoracic Indices.*

Age.	Indices.	Average.
MALES.		
1	6.8	6.8
2	6.2	6.2
3	5.9	5.9
4	5.8, 6.0	5.9
5	6.7, 6.4, 5.7	6.2
6	6.8, 5.5, 6.4, 6.1, 6.2, 6.0, 6.6, 6.6, 5.4, 5.4	6.1
5-10	6.5, 6.1, 6.1, 6.5	6.3
10-15	6.3, 6.0, 6.8, 6.8	6.4
15-20	6.3, 6.0	6.1
20-30	5.9, 6.3, 6.3	6.1
30-40	6.6, 6.4, 6.7	6.5
40-50	6.8, 6.7, 6.8, 6.3	6.6
	Average for all ages	6.25
FEMALES.		
5	5.7, 6.0, 5.7, 6.2, 6.2, 6.6	6.0
6	6.2, 6.0, 6.7, 5.8, 6.0	6.1
20-30	7.7, 7.1, 6.5	7.1
30-40	7.1, 6.6	6.8
40-50	6.8	6.8
	Average for all ages	6.5

The average index for all ages irrespective of sex was 6.3; the lowest variant was 5.4, the highest variant 7.7.

TABLE II.—*Abnormal Cardio-Thoracic Indices.*

Age.	Condition.	Index.
5-10	Mitral incompetence; chronic rheumatism	5.0
,,	Mitral incompetence, sequel to pneumonia	7.0
,,	Mitral stenosis	3.8
10-15	Mitral incompetence; chorea	5.0
,,	Tachycardia	4.1
,,	Aortic and mitral disease	4.8
15-20	No cardiac signs; chronic rheumatism; ? infantilism	7.2
,,	Aortic stenosis	4.3
,,	Arrhythmia; chorea (second); adherent pericardium	4.6
40-50	Mitral stenosis with severe arthritis	4.4
50-60	Emphysema	5.9

Figs. 2 and 3 are drawings from photographs of actual cyrtometer tracings of the chests of a certain number of cases with the cardiac dullness, circumference, and the cardio-thoracic index shown beside each tracing, together with the age and sex.

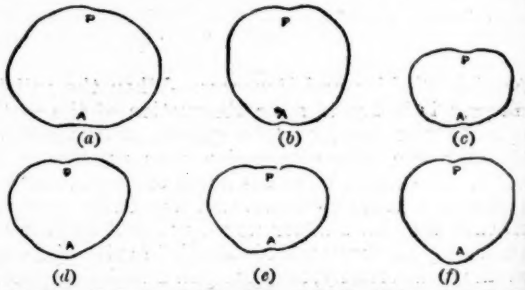

FIG. 2.—*Normal chests.* (*a*) Aged 30. A.P. dia. 8½ in.; C. dull. 5½ in.; circum., 31 in.; C.T.I. 1/6.6. (*b*) Aged 27. A.P. dia. 8¼ in.; C. dull. 5 in.; circum. 30 in.; C.T.I. 1/6. (*c*) Aged 9. A.P. dia. 5½ in.; C. dull. 4 in.; circum. 24 in.; C.T.I 1/6. (*d*) A.P. dia. 7 in.; C. dull. 4¼ in.; circum. 26½ in.; C.T.I. 1/6.3. (*e*) Aged 13. A.P. dia. 5¾ in.; C. dull. 4 in.; circum. 25½ in.; C.T.I. 1/6.5. (*f*) Aged 22. A.P. dia. 7¾ in.; C. dull. 5 in.; circum. 29 in.; C.T.I. 1/5.9.

A.P. dia.=antero-posterior diameter. C. dull.=cardiac dullness.
Circum.=circumference of chest. C.T.I.=cardio-thoracic index.

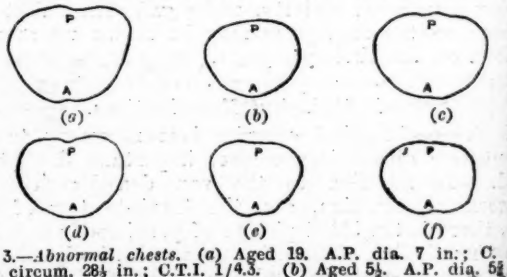

FIG. 3.—*Abnormal chests.* (*a*) Aged 19. A.P. dia. 7 in.; C. dull. 6½ in.; circum. 28½ in.; C.T.I. 1/4.3. (*b*) Aged 5½. A.P. dia. 5¾ in.; C. dull. 3 in.; circum. 21 in.; C.T.I. 1/7. (*c*) Aged 15. A.P. dia. 6 in.; C. dull. 5½ in.; circum. 25½ in.; C.T.I. 1/4.6. (*d*) Aged 12. A.P. dia. 5¾ in.; C. dull. 4½ in.; circum. 22 in.; C.T.I. 1/4.8. (*e*) Aged 8. A.P. dia. 5 in.; C. dull. 4 in.; circum. 20 in.; C.T.I. 1/5. (*f*) Aged 9. January 14th, 1925: A.P. dia. 5½ in.; C. dull. 4½ in.; circum. 20 in.; C.T.I. 1/4.7. November 25th, 1925: A.P. dia. 5½ in.; C. dull. 5¾ in.; circum. 22 in.; C.T.I. 1/3.8.

Fig. 2 may be considered to represent normal chests, and it will be seen that with such different sizes and shapes

at various ages the actual fraction is remarkably constant. Fig. 3 is that of similar cyrtometer tracings of individuals with abnormal conditions; whilst Fig. 4 shows drawings of what may be called "freak" chests. I merely include

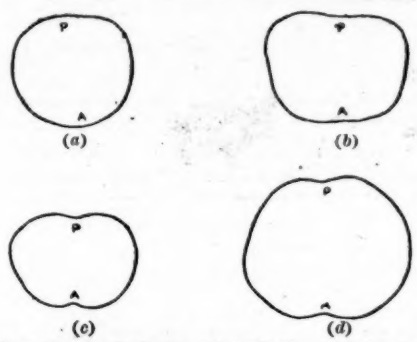

FIG. 4.—*Very abnormal chests.* (*a*) Aged 13. A.P. dia. 8 in.; C. dull. 4½ in.; circum. 25½ in.; C.T.I. 1/6. (*b*) Aged 15. A.P. dia. 7 in.; C. dull. 5 in.; circum. 29 in.; C.T.I. 1/5.8. (*c*) Aged 11. A.P. dia. 6 in.; C. dull. 6 in.; circum. 24½ in.; C.T.I. 1/4.1. (*d*) Aged 46. A.P. dia. 9 in.; circum. 35 in.

these last by way of interest, and as examples of the one or two conditions in which it is clinically impossible to determine the factor I have called the cardio-thoracic index which is emphasized in Fig. 5, which is an illustration of a chest with extreme emphysema. In such cases, or with chests which are very abnormally shaped, the most careful percussion of which I am capable has failed to map out the deep cardiac dullness. But such cases are comparatively rare, and in them every other clinical method is equally fallacious, so they do not materially invalidate the suggestion I have made above—namely, that the size of the heart can be expressed as a constant for any age, the deep cardiac dullness being one-sixth of the circumference of the chest at the level of the cardiac impulse.

FIG. 5.—The condition in extreme emphysema.

ARTIFICIAL PNEUMOTHORAX IN ADVANCED PULMONARY TUBERCULOSIS.

BY

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IN the BRITISH MEDICAL JOURNAL for February 19th, 1927 (p. 323), a case of pulmonary tuberculosis is described by Dr. Bernard Hudson in which, in spite of a history of old-standing disease with a recent severe "flare-up," an artificial pneumothorax was induced and resulted in considerable and continued improvement. The two following cases are of interest in this connexion.

CASE I.

An ex-officer, aged 26, was admitted to this sanatorium on August 30th, 1922, with a history of persistent cough and cold since the previous winter. Both upper lobes and the upper parts of both lower lobes were involved. The patient improved at first, increasing 28 lb. in weight. For the next year he held his own, but then lost ground slowly.

On August 27th, 1925, intermittent haemoptyses began, and on August 29th an artificial pneumothorax was induced. Intermittent bleeding continued for twelve hours, after which there was another haemorrhage of 10 ounces. A refill was given, and the bleeding gradually stopped.

The records of the first operations are as follows:

August, 29th, 1925, 1 a.m.	...	−4, −2	...	1,000 c.cm.	...	−2, +3
" " " 2.15 p.m.		−3, +1	...	1,000 c.cm.	...	0, +5
September 1st, 1925	...	−2, +4	...	500 c.cm.	...	+1, +7
" 5th, "	...	−2, +5	...	400 c.cm.	...	+2, +6

The patient gradually recovered from the effects of the haemorrhage and improved in general condition. Fairly high pressures were kept up throughout, and at the beginning of August, 1926, when I took charge of the sanatorium, the last records had been:

July 13th, 1926	...	−8, +2	...	800 c.cm.	...	−3, +5
July 27th, 1926	...	−10, +2	...	800 c.cm.	...	+2, +7

X-ray records had not been kept.

When I first saw him the patient had been in bed for four days because his temperature had risen to 102° for a couple of days after the last refill (June 27th), and he had had vague pains in the left side of the chest. On August 13th I attempted a refill, but found the pressure −1, +2. After introducing 150 c.cm. of air the pressure was +2, +3. On introducing the needle in a different place the pressure was again +2, +3, so the attempt was abandoned. After this the temperature rose to 99.4°, and there were again vague pains in the left side of the chest. About ten days later fluid appeared at the left base, and increased slowly until November 22nd, when it had reached the level of the third intercostal space. This was confirmed by *x*-ray examination. Fluid replacement was considered, but in the absence of marked dyspnoea or other signs of cardiac embarrassment, and in view of the pleurisy in August, it was decided to wait. The fluid gradually decreased and finally disappeared, leaving signs of much-thickened pleura. The weight, which for a long time had remained about 10 st., is now over 10 st. 5 lb., temperature and pulse are normal, and the patient is walking from three to four miles a day. The sputum is slight, and tubercle bacilli have been found only once since December 30th, 1926. The adventitious signs in the chest have remained about the same, except in so far as they have been modified by the presence of fluid and air respectively.

It is clear that in this case the ultimate prognosis is poor and the immediate risks not inconsiderable. At the same time the pneumothorax, which but for the haemorrhage would never have been attempted, has undoubtedly improved both the chances and the comfort of life. The fluid, by keeping up partial collapse for some months after the refills were stopped, doubtless contributed towards the result.

CASE II.

A girl, aged 20, was admitted in March, 1925, with a history of slight haemoptysis three and a half years previously and a recurrence in 1923. On admission, the right upper lobe and the upper half of the lower lobe were involved, and there was some suspicion about the left mid-scapular region. After an *x*-ray examination, Dr. A. E. Barclay of Manchester reported: "... evidence of extensive disease on the right side, which is almost all definitely of old standing. The apex is largely consolidated and fibroid, the trachea being dragged across fully three-quarters of an inch to this side.... From the interlobar septum downwards there are extensive changes of fibroid type.... On the left side ... some increase in root shadows with nodules, which are sharply defined, and do not give the impression of active disease."

In October an unsuccessful attempt to induce an artificial pneumothorax was made. The patient's condition meanwhile remained very much the same.

When I first saw her, in August, 1926, the symptoms were: troublesome cough frequently leading to vomiting, copious sputum swarming with tubercle bacilli, dyspnoea on exertion, and lack of energy. There were signs of definite activity at the left apex, as well as on the right side. The *x*-ray appearances were much the same as in February, 1925.

The patient asked me if nothing further could be done. The case did not appear to be particularly suitable for the use of sanocrysin, and so, before considering such a line of treatment, or further surgical measures, I felt that another attempt to induce an artificial pneumothorax should be made. The initial operation was performed on September 2nd, 1926, and I was fortunate enough to get into the pleural cavity without difficulty. The earliest records are as follows:

September 2nd, 1926	...	−3, −2	...	250 c.cm.	...	−2, −1
" 3rd, "	...	−4, −2	...	350 c.cm.	...	−2, 0
" 4th, "	...	−3, −1	...	400 c.cm.	...	−3, 0
" 8th, "	...	−2, −1	...	400 c.cm.	...	0, +1

At first only partial collapse was obtained. Almost the whole of the apex was adherent, and there were a number of adhesions near the base. Soon, however, the latter adhesions began to give way gradually, and at the beginning of January collapse was almost complete; the inner parts of the apex and upper lobe, however, remained adherent.

At the beginning of October no râles could be heard on the left side. X rays showed the trachea in normal position. On November 17th no tubercle bacilli were found, and none have been found since; soon after that date the cough disappeared and the sputum ceased.

There is still some dyspnoea, and a very quiet régime is being followed, with one short walk daily. It has not been possible to increase the intervals between refills beyond a fortnight, or even less, as re-expansion usually takes place rather rapidly.

In this case, owing to the length of history and the probability of adhesions, the chances of inducing an artificial pneumothorax appeared small. The operation was undertaken rather as a forlorn hope before going on to more serious surgical measures. Yet not only did the operation succeed, but, although the ultimate outlook is doubtful, the chances of life are certainly improved, and in the meantime the absence of severe cough with copious, offensive sputum, and the knowledge that she is no longer a source of danger to others, are in themselves a great boon to the patient.

Memoranda:

MEDICAL, SURGICAL, OBSTETRICAL.

THE LEUCOBLASTOSIS OF GLANDULAR FEVER.

A HEALTHY boy, aged 4 years, had been ill for one day. There was marked enlargement of cervical glands on both sides; the tonsils were red and swollen, and the temperature was 103° F. In three days he was much better, the tonsils were still large, and the swellings at the angles of the jaw were even greater. He made a good recovery.

On the fourth day, when glandular swelling was most marked, blood films showed normal red corpuscles and considerable leucocytosis, with differential count: polymorphs 50 per cent., eosinophils 2 per cent., mast cells 1 per cent., lymphocytes 29 per cent., mononuclears 13 per cent., plasma cells 1 per cent., myelocytes 1 per cent., leucoblasts 3 per cent. Leucoblasts in films from angina were new to me at the time (September, 1920), and, with the remarkable glandular enlargement, suggested incipient leukaemia. In referring to glandular fever Professor Gulland[1] said that he had never seen myeloblasts (leucoblasts) in the blood of these cases. As textbooks are reticent about these cells, it may be useful to describe them briefly.

The leucoblast resembles a large mononuclear cell. Its basophil cytoplasm is ample and may show azure granules. Its large oval or reniform nucleus stains well in a striped pattern. But cells differ in age, and, therefore, vary in form and staining. The form commonly seen is (1) a big cell with large kidney-shaped nucleus and ample light blue cytoplasm with or without scanty azure points. Development now proceeds in one of two directions: (2) the nucleus stains with denser stripes, and the cytoplasm shows numerous coarse, dark violet granules; or, (3) the nucleus becomes irregular, even polymorph, and the cytoplasm paler or lilac; these cells are soon indistinguishable from large mononuclears.

Some of the first are easily identified, and the second form is quite characteristic and not to be mistaken for any other cell of the blood. For this reason I included only the second form in my differential count and underestimated the leucoblasts present.

The description is in terms of Romanowsky staining, and for identifying leucoblasts I prefer the polychrome Manson blue method,[2] because it brings out the coarse, violet granules better and in a greater proportion of cells, just as in benign tertian infections it deeply stains Schüffner's dots. Jenner-Giemsa fails to do this.

West Ealing. ROBERT CRAIK, M.D.

PULMONARY EMBOLISM FOLLOWING FRACTURE OF LEG.

THE following case is of interest in connexion with the modern treatment of fractures by early massage, and raises the question whether it is likely to cause separation of blood clot and the resulting tragedy of pulmonary embolism. The case occurred at the height of the recent influenza epidemic, and splints were taken down only three or four times when the joint was very gently massaged by myself. Had my attentions been more frequent or vigorous I should probably have charged myself with being the unwitting instrument of causing this unfortunate man's death. It would be of interest to know how often pulmonary embolism follows fractures, whether treated by massage or otherwise.

A stone-breaker, aged 62, of spare build and in good health, fell when getting over a stile and sustained a simple Pott's fracture of the right ankle, the fibula being fractured about an inch and a half above the external malleolus and the medial malleolus torn off. Under chloroform the fracture was set and kept in position by lateral splints; the leg was hung in a Salter's cradle. Union was perfect, and movement quite good. Three weeks after the injury the patient complained of pain in the left side for which I was unable to account; I could detect no abnormal sounds, and put it down to a slight pleurisy due to his sleeping three feet away from an open window. I ordered mustard plasters, which were used for four or five days; the pain did not subside, though the patient was in excellent health and in the very best of spirits, expecting to be allowed up on crutches in a few days.

On the twenty-fourth day of the injury the patient was laughing and joking with his neighbours; on the twenty-fifth day his daughter was wakened at 6 a.m. by her father's peculiar breathing; she got up and went for a neighbour. The patient was dead before her return in a few minutes. A *post-mortem* examination was not performed.

As there was no heart lesion or other organic disease I think there is no doubt that this was a case of pulmonary embolism.

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[1] BRITISH MEDICAL JOURNAL, 1926, ii, 593.
[2] Ibid., 1924, ii, 788.

Reports of Societies.

CLEFT PALATE.

A DISCUSSION took place in the Section of Surgery of the Royal Society of Medicine on June 1st on the operative treatment of cleft palate. In the afternoon a number of cases in which operation had taken place some years previously with good anatomical and phonetic results were exhibited, and a discussion began at five o'clock which, with a brief interval for dinner, continued until after ten. Mr. V. WARREN LOW presided.

Sir JAMES BERRY exhibited several patients upon whom he had performed his lateral approximation operation, and the speech results were demonstrated to the meeting. The test sentence which they were asked to repeat was: "On a bridge, by a church, I met a flock of turkeys"; but one of the patients, a young man, said that he was not going to utter such nonsense, and he made a perfect little speech, in which he paid a tribute to his old nurse, who had taken pains after the operation in his childhood to educate him in voice formation. Sir James Berry said that the main, almost the only, object of operating upon a cleft palate was to enable the person to speak intelligibly. The view formerly held by some that the operation might be regarded as a life-saving one was now, he thought, exploded. A small proportion of clefts which were very narrow and limited to the soft palate could doubtless be closed within the first weeks or months of infancy by the operation of lateral approximation; but in the vast majority of cases it was impossible at this very early stage to perform the operation with any reasonable chance of success owing to the width of the cleft and the lowness of the palatine arch. The age of operation should be the earliest at which, in the experience of the operator, a lateral approximation operation would give a reasonable chance of closing the cleft. Generally this was from 18 months to 4 years. In the really difficult cases, such as a wide cleft involving the soft and most of the hard palate, it was often a good plan to close the cleft of the soft palate first and to leave the hard palate unclosed for a time, rather than risk failure of the whole line of union by attempting too much. It was the soft palate that was most important to close. If the hard palate was closed and the soft left unclosed after an operation little good usually was done; on the other hand, if the soft palate were successfully closed and the hard palate left unclosed the patient might be greatly benefited. His own views as to operation were based upon 276 cleft-palate patients, upon whom he had operated during the last thirty-three years. Before operation gross defects of teeth and tonsils should be remedied, though he thought routine excision of tonsils or adenoids unnecessary. In the case of wide and difficult clefts lateral incisions to relieve tension were frequently necessary on one or both sides, but they should, in his opinion, be as short as possible, seldom more than 1/2 inch in length, except in the case of secondary operations for large holes in the hard palate. Of late years he had been using lateral incisions less and less, replacing them as regards the soft palate by the use of deep tension stitches and rubber plates after the

method recommended by Brophy of Chicago. He was afraid to use the very long lateral incisions recommended by some, lest they damaged too much the palatine and pharyngeal muscles.

Mr. GUSY TURNER said that the total number of cases of cleft palate with which he had dealt operatively was 155, and upon these he had done 195 operations. The average age, excluding the cases over 12, at time of operation was just over four years. The deaths numbered four: haemorrhage, scarlet fever (2), under anaesthetic. Excluding these and the very recent operations, the anatomical results in the remaining 134 showed a complete restoration of the palate in 66; a union of the palate, but one or more pin-head holes persisting or a slightly bifid uvula, in 21; an enclosed area just beyond the alveolus, the remainder of the palate being completely closed, in 11; a shortened palate with no uvula and the soft palate in the form of a V in 8; a great part of the hard palate not united, but very little separation, in 9, and increasing degrees of non-success in the remainder. The functional results in 90 cases traced, all of them more than one year after operation, the average being six years, were: normal speech, 10; good, 31; moderate, 25; poor, 17; unintelligible, 3. Out of the 66 cases of complete anatomical restoration, 44 had been traced to discover the ultimate speech result, which was normal in 7, good in 20, fair in 14, and bad in 3. Sometimes with a bad anatomical palate the patient spoke wonderfully well, and conversely. He had thought that bad speech results might be due to the fact that the patient had had no opportunity of learning to speak well until he had already learned to speak badly, and that if the Langenbeck operation could be done before he learned to speak at all, better results might be forthcoming. In this hope he had been disappointed. Many of the patients operated on at a very early age and with complete anatomical success had not been good speakers. Why did these results vary so much? He thought it had something to do with the general architecture of the naso-pharynx, and with the whole of the muscular and neuro-muscular apparatus, and not only the palate. As to the age at which operation should be done, so far as soft palates were concerned, during the first year of life the cases did exceedingly well. With regard to other patients he had rather extended the age of operation. What mattered more than the age was the general health of the patient. If the operation took place in two stages, the soft palate should be operated upon first, and one should be content not to make such a good job of the hard palate. The making of a lateral incision was no essential part of the operation. If it was found that the approximation of the edges of the cleft could not be done without tension, then was the time to make a lateral incision. For main suture material he preferred silkworm gut, but for other than the main suture he was using catgut more extensively than he used to do.

Mr. O. L. ADDISON said that the two openers of the discussion had mentioned only the operation of medium suture. Of the other operations he had had no experience except the flap operation, and after seeing the immediate and late results of that operation he had no hesitation in saying that he thought it a hopeless procedure. The immediate results as regards mortality were grave, as regards closure of the palate they were bad, and the remote effects were perfectly deplorable. He had recently seen three children, aged about 14 or 15, who had come to him for other conditions; a flap operation had been done upon them some time previously, and in each case it would have been infinitely better had they been left alone. Speech in his opinion was entirely a question of determination and training. Good anatomical results were sometimes followed by unintelligible speech. During recent years he had confined himself to the Langenbeck operation, the only modification being that he used a long lateral incision. It was not until he began to use that incision that he got any successful results at all. He practically always removed the tonsils before the palate operation, mainly because he regarded them as reservoirs of potential sepsis. He had come to the conclusion that one got better movement by employing a long lateral incision because one had to do less separation of the soft palate from the back of the hard.

Dr. VICTOR VEAU (Paris) said that he had first operated according to the Langenbeck method, but he found it not very satisfactory in anatomical results, and very unsatisfactory in speech results. Therefore he turned to the method of Arbuthnot Lane, which he had practised in about 320 cases, and anatomically he had had 91 per cent. of successes and 9 per cent. of what he called checks. The phonetic results were better also than with the Langenbeck operation. In his view the excellence of the phonetic result was not altogether dependent on the anatomical result, but had to do with the child's intelligence and above all with acuteness of hearing. He described by means of a series of illustrations his exact technique, especially his provision for a complete epithelial covering for all raw surfaces, and his practice of muscle suture as a means of preventing tension on the palate.

Mr. A. T. PITTS, speaking as a dental surgeon, said that many dentists had been hostile critics of the operative treatment of cleft palate, but while there might be on their part an unconscious bias in favour of prosthetic treatment, it must be acknowledged that surgery did not always succeed. Even if closure of the cleft were obtained the functional results might be poor. A most serious degree of deformity of the jaws might follow. When surgical efforts failed the original condition was much worsened, and the case drifted into the hands of the dentist as a last resort. Nevertheless he believed the best treatment of cleft palate to be surgical, though as at present practised it was not ideal in its result. Both the Langenbeck and the flap operation tended to produce some distortion of the dental arch, the flap operation bringing about a unilateral narrowing, and Langenbeck's a bilateral narrowing. The deformity produced by the Langenbeck operation was far less than that which followed the other. If it could be shown that the percentage of success in closing the cleft was greater with the flap, or that the functional results were better, then the greater degree of deformity of the dental arch might not outweigh these advantages; but if the operative success and the functional success of the two operations were the same the effect on the dental arch might well be the determining factor. His impression as a dentist was that so far as the closure of the cleft and the speech results were concerned, the flap operation had no such advantage over the Langenbeck as to outweigh the bad effect on the teeth and jaws. He doubted also whether repeated attempts at operation were wise. Perhaps the surgeon would do well to abrogate early in favour of dental treatment before the tissues were so damaged or distorted that prosthetic restoration became difficult or could only be partially successful. He urged the need for a greater liaison between surgeon and dentist.

Mr. CYRIL NITCH said that he had records of 86 cases operated upon, of which only 43 had been traced. The age at which the cleft should be closed depended upon the type of operation performed. If the flap operation of the Lane type, it must be performed about four months before the teeth were developed. He had not performed this operation since 1913, for although one could always guarantee the closing of the cleft by that method, the soft palate was always short and rigid, and speech, therefore, was bad. The age he generally selected was 18 months to 2 years. When the cleft was very wide the operation was deferred until the palatal processes and the soft palate had grown wide enough to afford tissue offering a reasonable chance of success. He always tried to close the whole cleft at one operation, provided the anterior palatine arch could be preserved. When the alveolus was cleft the mother was taught, after the hare-lip was sutured, to press on the alveolus twice daily with the thumb and so drive it backwards. He always made long lateral incisions, and placed them close to the alveolus, at the posterior border, curving them outwards and directing them downwards towards the last molar tooth of the lower jaw. One important point after operation was to teach the mother to massage the soft palate as soon as firm union had taken place, by putting the ball of the finger against the soft palate and rubbing transversely. With his modified Langenbeck method with long relieving incisions and lateral splints, the failures had been reduced to 17 per cent. instead of the 50 per cent. which had followed the unmodified Langenbeck procedure.

Mr. CORTLANDT MACMAHON, who has been in charge of the Speech Clinic at St. Bartholomew's for sixteen years, said that in the speech of these patients there were five blemishes—the pronunciation of *k*, *g*, *d*, and *t*, and, most seriously of all, *s*. The education for getting these letters was really very easy, and even in the case of *s* it could be done by driving the tongue down and getting a stretching between the soft palate and the back of the tongue. Some of the good speakers would be better still if they were trained to lower their voice by an octave. His earlier experience of speech training in these cases was with the flap operation. Lane's operation gave good speech if the patient was properly trained, but if the training was deficient the result was likely to be less good than after Langenbeck's operation with similar training.

Mr. H. D. GILLIES added a few points about secondary operations. The great majority of the cases would be vastly improved by severing the soft from the hard palate, making provision for an epithelial covering of all raw surfaces, and interposing an appliance between the soft and the hard palate, so placing the soft palate with its muscle that it could assist in closing off the nasal from the buccal cavity. Mr. Gillies also remarked upon the contrary opinions which had been expressed by various speakers as to the speech result. Mr. Addison had said that the power of speech was due to the intelligence of the patient, Dr. Veau that it was due to acute hearing, and Mr. MacMahon that it was due to cunning movements of the throat by means of which the oral-nasal failure was circumvented. This only showed the complexity of the problem.

Mr. C. H. FAGGE said that up to the end of 1924 he had operated on 114 cleft palates. He had aimed at as complete anatomical re-position of the tissues as possible—in other words, closure of the hard palate and closure of the soft. He agreed that the soft palate was the more important part, but he had not neglected to try to close the hard. On his 114 cases he had performed 218 operations, but that figure was fallacious, because some of the operations were on the lips, and some followed defects of a previous lip operation, necessitating an epithelial inlay. A good many also were operations for the closure of holes in the palate, done before he learned that the holes might well be left alone because they closed of themselves or got smaller. He described a combined operation which he used in the largest group of cases—those, namely, with a unilateral cleft, nearly always running right through into the nose. First of all he did a Lane's flap on the hard palate, then the hare-lip operation, and then followed with the classical procedure for closing the soft palate. He had never failed to close the hard palate with a Lane's flap, nor had he seen any case break down. The Lane's flap operation on the hard palate did not make the second operation on the soft palate more difficult. He liked, if possible, to undertake both operations, for the closing of the hard and of the soft palate, before the child's first dentition, for then he was more assured of a good anatomical result. He had operated on a fair number of adults, but the case in which he felt the greatest difficulty was with the child of 2 or 3. The operation in the case of a small baby was not difficult, and the testimony of the sisters was that the baby was not difficult to nurse. With his combined method of operation he had had 62 per cent. of successes, 22 per cent. of partial successes, and he did not think any operation could be written down as an absolute failure. Sometimes, however, a good anatomical result went with a bad functional result, and again, despite a bad anatomical result, the functional result might be quite good. In the Langenbeck operation he made use of a very long incision on either side to relieve tension.

Mr. KELSEY FRY, speaking as a dental surgeon, said that he had had to do with a large number of children who had undergone operation but without success from the point of view of function. The treatment that the dental surgeon could give in these cases of surgical failure was very difficult and complicated. Special appliances had to be made which always wanted repair and which were a nuisance to the child for the rest of his life. If the surgeon could provide for the cleft palate patient a functional soft palate it would be an easy matter for the dentist to provide a hard palate.

Mr. F. W. GOYDER (Bradford), speaking as a provincial surgeon whose colleagues did not touch these cases, and who therefore had little opportunity of comparing his results with those of others, said that he had dealt with about 150 cases, but he could not give exact statistics as to the results. He began with Lane's operation, but he got disgusted with the results, and during the period of the war and for some time afterwards he took very little interest in this subject. Now he had begun again, and increasing experience had made him more certain of closing the cleft, but at the same time more pessimistic as to the final results with regard to speech. As time had gone on he had operated later and later in life, and now he rarely performed an operation on a child younger than 3 years of age. He performed Langenbeck's operation except when the clefts were very wide. In his last 22 cases he had used a flap in 11, and the median operation in the other 11. Even when doing Langenbeck's operation, however, he used narrow flaps and united them so as to leave no raw surface. He was not in favour of two-stage operations.

Mr. L. E. BARRINGTON-WARD said that his remarks were based on 148 cases (132 hospital and 16 private) on which he had operated since 1914. Of these, 29 were not to be traced. The failures numbered 6. In one of these cases there was a complete horseshoe cleft, which was the hardest type of all to deal with. Three showed a deficiency of the hard or soft palate, and in two the alveolus was still cleft. With regard to age, he believed that if a hare-lip was associated with the deformity, operation should take place as early as possible; his usual rule was to operate at 1 month. Otherwise he preferred to operate at the age of 18 months or 2 years or later. The nature of the operation which he did might be described as Langenbeck's, but he thought that posterity might prefer to call it Berry's operation. It was lateral approximation to the median suture. He made lateral incisions, their extent entirely depending upon the case. For sutures he used the finest ophthalmic silkworm gut. He believed that relaxation sutures nearly always cut out or produced ulceration, and added to the infection. With regard to the speech tests in his cases, 58 had been tested recently, and in 20 the speech was good, in 18 it was fair, and in 20 it was bad. Four of the patients in this last category were mental deficients. If he were asked with regard to the prognosis from the point of view of speech in any case of cleft palate he would have regard not so much to the type of cleft as to the intelligence of the mother.

Mr. TWISTINGTON HIGGINS said that his own cases numbered only 47, and they had all been operated on since 1921. He had followed the method advised by Mr. Gillies, which was relatively easy; the only difficulty was the epithelial graft with which it was necessary to cover the raw area. In 15 cases also he had followed the method advised by Mr. Addison, including even the removal of the tonsils. What had impressed him about the tonsils was that almost universally they were infected, even though externally they might not appear to be so. He thought that the tonsil was fully proved to be a focus of infection in these cases. The 15 cases which he had done according to Mr. Addison's method gave better results than he had achieved by the unmodified Langenbeck operation, and in 14 of them there was perfect anatomical closure.

Mr. WARREN LOW, in closing the discussion, congratulated the Section on the success of the occasion. Seldom had so many successful cases of cleft palate been gathered together in one building. One thing that struck him was the extraordinarily hopeful outlook now for a child who was born with cleft palate, and he thought that the discussion had been a wonderful justification for what was known as the median suture method. He was sorry that not more had been heard about the Brophy operation. Dr. Brophy had sent from Chicago a small contribution to the discussion, chiefly relating, however, to the number of cases which certain of his colleagues had done and the negligible proportion of mortality and necrosis.

Sir JAMES BERRY and Mr. GREY TURNER also replied without, however, taking up any of the points which had been raised in the debate, contenting themselves with an expression of gratification that so noteworthy a discussion had been forthcoming.

CHRONIC FIBROUS EPIPLOITIS.

AT a meeting of the Section of Surgery of the Royal Academy of Medicine in Ireland on May 13th, Mr. R. C. B. MAUNSELL, who was in the chair, described an unusual condition which he termed "chronic fibrous epiploitis." The case is reported in full at page 1051 of this issue.

Mr. ARTHUR CHANCE said that he had never seen a similar case, but he presumed that the process was an inflammatory one, as it was apparently limited to the abdomen, below the transverse colon. He thought it was a pity that it had not been possible to see the peritoneum covering the liver and spleen.

Deep X-Ray Therapy.

Dr. M. HAYES read a paper on experiences of the treatment by deep *x* rays of 180 cases, which were chiefly malignant. He said that the qualitative and quantitative standards in the matter of dosage evolved by Saitz and Wintz had laid the foundations of rational radiotherapy. "Deep *x*-ray" and "Erlangen treatment" were not synonymous terms. Deep or highly penetrating *x* rays were now universally employed in the treatment of malignant disease, and the results obtained were much better than by the older methods. The Erlangen technique, whereby "the lethal dose" was administered at a single sitting of many hours' duration, did not, in the experience of many, give as good results as carefully estimated fractional doses of highly penetrating *x* rays administered over long periods. In the prophylactic post-operative treatment of mammary carcinoma repeated fractional doses gave better results than massive doses. Inoperable cases were ameliorated—pain was relieved, ulceration was retarded, and life was prolonged. Rectal carcinoma was likewise benefited, and sometimes inoperable cases became operable, or the symptoms might completely disappear. Recurrent oral carcinoma was not materially benefited, but some primary lesions, more especially of the lip and the tonsil, responded very favourably. Radium combined with *x* rays in the treatment of inoperable uterine carcinoma arrested discharge and haemorrhage and greatly relieved the symptoms. Some post-operative recurrences had responded favourably to treatment. The result obtained in carcinoma of the prostate was not very favourable, but the symptoms of prostatic hypertrophy usually disappeared within two months. In sarcoma of bone the response to treatment was often very satisfactory.

The CHAIRMAN said that for many years he had been treating cases of mammary carcinoma in which recurrence had taken place by *x* rays. He had never seen the least harm follow the treatment, and practically always benefit had resulted. After a complete operation for carcinoma he made it a rule always to get the patients treated subsequently by *x* rays, but it was too soon yet to say what the effect of this would be. He, however, thought that it was a wise thing to do, and always advised patients to have one or even more than one course of *x*-ray treatment. Usually patients had fifteen exposures, followed by a rest, and then a further fifteen exposures. He thought it was essential that a patient should be told if he had cancer, because otherwise he would not allow the surgeon to perform a sufficiently radical operation; a patient should be informed that the only hope of cure was a really radical operation, and also post-operative treatment by *x* rays. He had had only one case of a malignant thyroid *x*-rayed, and the patient had not seemed to derive much benefit. It was, however, a very advanced case, and so was not a fair test. Radiation seemed to him to be a method of great benefit in the post-operative treatment of cancer.

Dr. R. STUMPF said that Dr. Hayes's technique was almost the same as the technique which was being used in Germany, and which he was now using in Dublin. He thought, however, that scattering of the dose for two to six days did not make much difference to the final result. In uterine cancer his experience had been mostly limited to inoperable cases. He had given prophylactic post-operative treatment to twenty cases, and of these, fifteen had remained free of the disease for varying periods. He thought that every inoperable case of mammary cancer should be given a trial of treatment by *x* rays, and every case operated on should be given post-operative treatment by *x* rays. In cancer of the lip operation should be undertaken wherever possible, and radiation should be given to inoperable cases. The thyroid was one of the most satisfactory organs to treat by means of *x* rays, and he thought that in thyroid cases, if initial treatment by *x* rays was given, the results obtained from operation would be more successful. In cancer of the rectum there was nothing to choose between operative and *x*-ray treatment, but a combination of the two gave fairly good results—at any rate, better than treatment by either means alone. By the use of *x* rays one could sometimes render inoperable cases operable. In his experience of cancer of the rectum, women did not respond to treatment so satisfactorily as men.

Mr. W. C. STEVENSON said that if very small doses of radium had been given at very long intervals the results obtained would not have resembled those which Dr. Hayes had obtained, but there would have been less disturbance of the patient, and it was likely that better work would be done without affecting the patient's constitution. He thought that very massive doses of radium had a bad effect on the other tissues besides the malignant tissues, and that the resistance of the tissues was very much lowered by an overdose. The one risk of giving a small dose and not repeating it was that of increasing the power of the cancer to resist radiation subsequently. He liked to see a malignant growth disappear altogether, as he always felt suspicious if there was a lump left behind after irradiation. He had found that cases of cancer of the breast did well by radiation. The results that he had obtained in cases of cancer of the mouth were, on the whole, unsatisfactory. He had treated some cases in which the malignant disease had involved the bones, but without much effect. He thought it was necessary to recognize that some patients could not be helped much by radiation, and also that in some cases the results could not be permanent, although pain might be temporarily relieved.

Dr. HAYES, in replying, thought there was very little doubt that small quantities of radium did stimulate, and that large doses destroyed and inhibited. This had been proved on vegetable matter, but how far it could be employed on human beings it was difficult to know. He also liked to see the lump disappear altogether, but in many cases he thought that complete disappearance of the growth could not be expected. One of the rare occasions on which he had seen the whole growth disappear was in a case of sarcoma of the tonsil. Other growths, he thought, could not disappear without leaving fibrosis, and the problem was, how long the cancer cells remained in the fibrosis. This, in his opinion, was a very strong argument for prophylactic treatment following surgical radiotherapy. In cases of prostatic hypertrophy he generally tried to give a dose of from 90 to 100 per cent. It was as yet too early to say whether the treatment of these patients by radium would render operation unnecessary in the future.

MENINGOCOCCAL MENINGITIS.

AT a meeting of the Section of Pathology of the Royal Academy of Medicine in Ireland on April 29th, the President, Professor J. W. BIGGER in the chair, Dr. R. H. MICKS and Dr. J. LAIT showed jointly the brain and spinal cord from a case of meningococcus meningitis in a child. The main clinical features of the case were that, in spite of early and vigorous treatment, the patient grew steadily worse and died in the ninth week of the disease, and that subarachnoid blocking gradually developed. During the first week lumbar punctures withdrew from 40 to 50 c.cm. pus each time with consequent relief of headache. Then less and less fluid was obtained on each occasion and no relief to the headache was afforded by the withdrawal. Finally, about six weeks after the onset, it became impossible to obtain fluid. Although headache and vomiting were present no cranial nerve paralyses or optic neuritis developed during the nine weeks. From the start wasting and spasticity of the lower limbs were unusually well marked. Dr. Lait reported the following pathological findings. The pia-arachnoid was very congested and dry,

and there was some flattening of the convolutions over the surface of the cerebrum, but no exudate was found. The base of the brain, however, showed a thick, greenish-yellow exudate in the regions of the cisterna interpeduncularis and the cisterna magna. The rest of the base of the brain was free from exudate. All the ventricles of the brain were dilated and filled with a turbid fluid. The ventricular walls were hyperaemic, with adherent masses of a fibrino-purulent exudate. There was softening of the brain tissue around the ventricles. The hydrocephalus was due to the blockage by the exudate of the foramina in the pial roof of the fourth ventricle. There were extradural and subdural haemorrhages in the dorsal and lumbar regions of the cord. A purulent exudate in the pia-arachnoid extended practically along the whole dorsal and lumbar regions of the cord, especially on its posterior aspect. Dr. Lait said that infection in these cases was spread by the blood stream rather than directly through the nasopharynx. He mentioned the view of Carnegie Dickson that ventricular infection often preceded that of the meninges. The causative organism, in this case, had been frequently isolated from the cerebro-spinal fluid, but no ventricular puncture had been made.

The PRESIDENT did not consider this a typical case of cerebro-spinal meningitis either clinically or pathologically. He discussed the spread of the meningococci from the nasopharynx to the brain, and thought there was a bacteriaemia rather than a septicaemia. Dr. H. G. WESTROPP said he had thought at first that the child was only suffering from influenza. She had complained of a headache first and had later vomited. The next day the child was somewhat better, but after two days she became worse, a rash developed, and she complained of pain in her feet, which were very tender. Dr. V. M. SYNGE said he thought the failure of treatment in this case was explained by the pathological findings of internal hydrocephalus, as the serum was not able to get at the seat of the trouble. He referred to Sir James Purves-Stewart's suggestion that in these cases the ventricles should be tapped, and the serum then injected into the ventricles, and also the treatment by tapping the cisterna magna. Dr. W. M. CROFTON thought an autogenous antigen should have been used in this case as being more powerful than serum. Dr. C. MURPHY said that he always injected fresh serum as well as antimeningococcic serum.

Etiology of Cancer.

Dr. JOSEPH T. WIGHAM read a paper on the cause and cure of cancer, dealing with the history of investigations into its nature and causation. Cellular overgrowth might be due to a stimulation of growth or to the removal of an inhibition, and various points of evidence were submitted. Predisposing causes were next considered, including chronic irritation, misplacement of cells or tissues, heredity, and parasites. The most effective of the chemical substances which had been regarded as chronic irritants were those which had a solvent action on fats and lipoids, and much work had been performed on these tars and oils, and on the effect of injecting such substances as Sudan III. The work of Gye and Barnard had revived interest in the possibility of a true living virus being the cause of tumours, but their results had been contested. It seemed also that cancer could be induced in rats by feeding them with the larval forms of several round worms and flukes, and cancer of the liver in man, and possibly of the tongue and oesophagus, had also been attributed to an infection with worms. Passing to the epidemiological investigation of cancer, Dr. Wigham said that Sambon in Italy, other investigators in Holland, and the Health Committee of the League of Nations, as well as other workers elsewhere, had all contributed information showing the variable incidence of cancer; this might lead to further light being thrown on the environmental conditions in which cancer most frequently arose.

The PRESIDENT said that he did not think that a cure would ever be obtained for cancer until its etiology had been discovered. In almost all cases of cancer there were two possible causes. One was its production by an irritating substance or substances; yet many people developed cancer who were never exposed to irritating substances. The other cause was some factor which was apparently inherent in the subject himself. The President believed that there was a third factor, as yet unknown, and he thought that it was a failure to discover this factor which accounted for the inability of some workers to get good results in treatment while others seemed to be more successful.

Dr. W. M. CROFTON referred to the work performed by the Laytons in connexion with sarcoma in rats, which had never been reproduced or refuted, and mentioned that some workers claimed to get good results from putting patients on a diet free from fat-soluble vitamin.

Dr. A. R. PARSONS could not agree with Dr. Wigham that the modern treatment of cancer by radiation was not much better than the old method of treatment by caustics. He thought that in *x*-ray treatment something much more potent than the old cures was being employed, even though the disappearance of tumours after *x*-ray treatment was only temporary.

Dr. W. STEVENSON said that the difference between radiation and the old method of treatment by caustics was that paste killed everything with which it came in contact, and radiation had some selective action. The effect of radium in some cases was extraordinary. He mentioned a case of cancer of the tongue in which, after three days' treatment, the lump had almost disappeared. Radiation differed in its effects in different parts of the body. In some cases healing was stimulated by radiation. He referred to a case of a septic tumour of the breast, in which radiation had been given; the breast had been removed, and the skin had healed by first intention. He thought in some cases surgeons would be able to do a great deal more than they did if the patients were treated by radiation first. Sepsis had much to do with the causation of malignant conditions, and anything which prevented it would help in curing cancer.

Pathology of Lymphosarcoma.

Dr. J. E. DEALE read notes on a case of lymphosarcoma; Dr. J. T. WIGHAM demonstrated specimens. At the *post-mortem* examination it had been found that in and about the head of the pancreas and extending up into the hilum of the liver were several rounded masses up to the size of a walnut, and fairly easily separated from the surrounding tissue. These resembled enlarged lymph glands, and were dead white in colour, with a few vessels or slight haemorrhage. The liver was large, weighing 8 lb., and had a rather coarsely lobulated appearance of the cut surface. Microscopically the liver tissue was divided into masses roughly equivalent to individual lobules, by a tissue composed of a few fibres, a considerable number of large cells with large darkly staining and occasionally multiple nuclei, and a great number of small round cells. The cells of the liver tissue showed regeneration, having large, and occasionally multiple, nuclei. This appearance, although not quite uniform, was that of the greater part of the organ. The spleen weighed 25 oz., and was much congested; the surface showed a number of knobby projections, some of which appeared to be infarcts, composed mostly of necrotic material, with much surrounding haemorrhage. One or two whitish masses were probably tumour growths. The more healthy splenic tissue showed large blood spaces, with much blood. The changes in the spleen were evidently mostly those of chronic congestion, due to the condition of the liver, and perhaps also to the pressure of tumour masses on the splenic vein. The condition was probably one of a diffuse lymphosarcomatous infiltration of the liver, with outlying development in lymph glands.

The PRESIDENT said that the liver was about two and a half times the normal size, apparently due to the diffuse nature of the tumour throughout it. Dr. J. LAIT mentioned a somewhat similar case in which there had been an enlargement of glands about the head of the pancreas. The liver, however, had been free from tumour deposits, whereas the spleen was greatly enlarged by a diffuse sarcomatous growth. It was also a case of lymphosarcoma, but he had considered it primary in the glands with secondary manifestation in the spleen. Dr. A. R. PARSONS said it was very unusual to find such a marked polymorphonuclear leucocytosis in a case of lymphosarcoma.

Reviews.

GASTROSCOPY.

Practical Gastroscopy[1] is the title of a monograph by Dr. JEAN RACHET of Paris, translated into English by Dr. IMIANITOFF of Brussels. After a short introduction the subject is surveyed from the historical aspect, and it is astonishing to find what an amount of work has already been done; the extent of the literature is shown by the annexed bibliography. Most of Rachet's observations were made in Dr. Bensaude's clinic at the Hospital St. Antoine, Paris. A special type of instrument is fully described, and the exact method of introducing it into the stomach; this evidently calls for a considerable amount of care and skill, and, even so, in many cases the examination cannot be completed; in a series of sixty consecutive cases failure occurred in fifteen, owing to malformation of the mouth and neck or to psychic reactions aroused in the patient. The author also points out that great care must be used in selecting suitable cases, and that it cannot be looked upon as a routine method of examination. The results of gastroscopy are next described, and a final chapter deals with the conclusions that can be drawn.

In discussing the general principles involved it is admitted that gastroscopy is an exceptional method of exploring the stomach, and comes after clinical investigations and *x*-ray examination, but it is claimed that it should come before an exploratory laparotomy. It can only safely be carried out by carefully trained specialists, and although any positive evidence discovered is of value, a negative result is of no practical value inasmuch as the examination does not permit a view of the whole stomach.

The book is very well presented and contains many excellent diagrams, drawings, and reproductions of radiographs. All those interested in the subject will find it of considerable value from many points of view, and it brings the subject well up to date.

FIRST AID IN MATHEMATICS.

NOBODY doubts the value of the mathematical tool in scientific research; sooner or later, most people who do any intellectual work at all are brought up against some equation or formula, and many of them wish to understand how these formulae are constructed. Hence there is a steady demand for introductions to mathematics. Many great mathematicians have tried to supply the demand. In England, De Morgan, Clifford, and Whitehead all tried their hands, and the name of less famous men who have written introductions to mathematics is legion. Messrs. Caradog Jones and Daniels are the latest interpreters between the professional and the amateur. There is a certain analogy between the study of a language and the study of mathematics, and perhaps some disappointment would be saved if this were realized. If one discovers the need of a knowledge of, let us say, Persian, to satisfy some intellectual curiosity (we purposely choose a language which few Londoners are in the way of learning colloquially) one will probably obtain a grammar, learn the alphabet and the elements of accidence and syntax, and then tackle an easy book with a translation. What nobody will expect is, by reading a grammar, to become a master of the whole Persian literature or to undergo so strange a metamorphosis as to be turned into a "Persian." But many people do seem to expect that the perusal of a manual ought to make them free of the whole literature of mathematics and, finding this is not so, are apt to conclude that mathematics are "beyond them." In order to encourage such readers, the tendency of modern introducers is to illustrate their arguments upon data likely to interest particular classes of investigators. Many such books have been written for chemists, and Dr. W. M. Feldman recently wrote one for medical men. Messrs. Caradog Jones and Daniels have had specially in mind persons interested in economics and statistics. Their little *Elements of Mathematics*[2] can be recommended as a quite readable introduction. To medical readers the last part of the book is not of special interest and, for most readers, the first three chapters are perhaps a trifle diffuse. The wording of page 112 is, we think, open to criticism; it is best to restrict the use of the term "convergent" to series consisting of an infinite number of terms. It is, however, very easy to criticize such a book and very hard to write one. We think this is essentially a good book, and can recommend it.

THE FIVE SENSES.

IN *Les Cinq Sens*[3] Dr. CABANÈS has gathered together an immense number of notes and anecdotes about the senses of hearing, taste, sight, and smell. The curious customs of sundry tribes of men, ancient and modern, which are described, are connected not only with the five senses, but also with all the organs accessory to each. For the sense of touch the reader is referred to an earlier volume,[4] in which, however, not much is said about the actual sense of touch, though many pages are devoted to the hands. The use of fingerprints in the identification of criminals is mentioned, its origin in the investigations of Francis Galton, and the methods by which the prints are obtained. To be left-handed is said to be a sign of inferiority, but Dr. Cabanès urges the cultivation of ambidexterity, notwithstanding a caustic remark of Malgaigne about an ambidextrous surgeon. On the subject of fingernails we are told that both Napoleon and his "torturer," Sir Hudson Lowe, were in the habit of biting their nails; and that in Spain a subject once set for a thesis in medicine was whether it was necessary for health to begin by cutting the nails of the right hand or of the left, and whether the thumb should be taken first or the little finger.

An account is given of the various disfigurements of the external ear by rings, plugs of wood, and what not; the removal of the ear in malefactors; the story of the narrow escape of Daniel Defoe from losing his ears in the pillory; and the discovery of artificial ears in Egyptian mummies. Under taste are included notes not only on strange perversions, such as those of the earth-eaters, of cannibals, and of polyphages, but also on beliefs in the properties, therapeutic or poisonous, of the saliva, the practice of amputation of the uvula in children by Persian barbers, and hypotheses about the use or otherwise of the tonsils in singers. In connexion with sight, methods of beautifying the eyebrows amongst the Romans by joining them together by pigments are mentioned; and there is a note to the effect that the Patagonian woman goes to the other extreme by practising epilation of the eyebrows. About the nose many anecdotes and superstitions are recorded. Thus it appears that M. Bernard attributes to the size of Zola's nose the invention of a language of smells in that author's novels. English readers may be somewhat surprised at some of the customs Dr. Cabanès states to exist in this country. Thus English coquetry is said to be gratified by a hairdresser who sews hair of an approved shade into the edge of the eyelids, and curls the new lashes with silver curling-tongs. In England, if you wish to scoff at anyone, you cry, "To nose, to nose" (*Au nez, au nez*). Perhaps there is some confusion here between the errand-boy's method of indicating contempt and the meaning of the vulgarism "to nose." And is there really a sect of English botanists called anthophages, whose habitual diet is cauliflowers and artichokes? However, with allowances for his difficulties with foreign customs, of which he has only hearsay evidence, Dr. Cabanès's books are an entertaining collection of wild and weird beliefs and habits.

[1] *Practical Gastroscopy.* By Jean Rachet, M.D. Authorized translation by Fred. F. Imianitoff, D.Sc., B.A., M.R.C.S. London: Baillière, Tindall and Cox. 1927. (Demy 8vo, pp. xii + 146; 46 figures, 10 plates. 15s. 6d. net.)

[2] *Elements of Mathematics.* By D. Caradog Jones, M.A., and G. W. Daniels, M.A., M.Com. Liverpool: University Press of Liverpool, Ltd.; London: Hodder and Stoughton, Ltd. 1926. (Cr. 8vo, pp. viii + 240. 8s. 6d. net.)

[3] *Les Cinq Sens.* Par Dr. Cabanès. Paris: E. Le François. 1926. (Imp. 16mo, pp. 308. 10 fr.)

[4] *Les Curiosités de la Médecine.* Par Dr. Cabanès. Paris: E. Le François. 1925. (Imp. 16mo, pp. 330. 10 fr.)

URINARY SURGERY.

MR. W. K. IRWIN, F.R.C.S.E., has issued, with the title *Urinary Surgery*,[5] a new edition of his book *Surgical Urology*. The alteration has been made because it had been objected that the old title was ambiguous and did not define accurately the scope of the work. The book, though revised and enlarged, presents the same essential features. After dealing with anatomy and the examination of the patient, the seven chief symptoms of genito-urinary lesions form the subjects of separate chapters; special attention is paid to their causation and treatment. These chief symptoms have been grouped under the following headings: incontinence of urine, frequent micturition, difficult micturition, retention, pain, haematuria, and pyuria. In the author's opinion, and we are inclined to agree with him, this arrangement, although it necessarily leads to repetition and renders the book less convenient as a work of reference, corresponds more exactly with the clinical conditions encountered, and furnishes the practitioner with information of great practical value in his everyday work. Since it is intended for those called upon to weigh the pros and cons of operation rather than to carry out the operation itself, the details of operative procedure are omitted and only a brief sketch given of the surgical aspect of the subject. The book is clearly written and is practical in its outlook. The fact that it is occasionally dogmatic in its tone and that it avoids any discussion of theory or debatable matter is an advantage rather than a shortcoming.

THE EXCITABILITY OF NERVES.

PROFESSOR LAPICQUE'S monograph on excitability as a function of time[6] deals in the first instance with Du Bois-Reymond's law of excitation, which was based on the idea that the response observed in muscle on electrical stimulation is not dependent on the absolute value of the density of the current, but on the variation of its value from instant to instant. Although the law has been shown to be untrue and it is now known that the current excites, not by its variation, but by the first instants of its passage, Du Bois-Reymond's authority dominated for more than half a century. This lengthy usurpation is attributed by the author to a certain shyness exhibited by physiologists towards mathematics, and he emphasizes the importance of a familiarity with mathematical language if errors are not to remain undetected. Making an unstinted use of mathematical language, he passes in review the progress of thought from Du Bois-Reymond to Weiss, he discusses Pflüger's work on electrotonus, von Bezold on the latent period, Fick on the muscle of Anodon, Brucke on curarized muscle, Engelmann on the contractions of the ureter, Hoorweg on excitation by condensor-discharge, and Waller's characteristic of excitation. In the second part of the work the quantitative data afforded by experiment are discussed, while the third part is devoted to theoretical considerations and an attempt to establish a physical theory of electrical stimulation, taking as a starting-point the conception of Nernst and ending with his own researches and his conception of chronaxy or excitability expressed as a mathematical constant of time.

The main object of the book is indeed to explain chronaxy, and in the fourth part the author has given an account of the subject in language which can be comprehended by the non-mathematical. When a progressive current, uniformly increasing in intensity, is led into a muscle, the relation between the intensity and the duration of the stimulus, calculated at the threshold of contraction, can be expressed by a curve of definite form, the abscissa marking the duration and the ordinate the intensity. Beyond a certain duration the two magnitudes become independent, the intensity remaining constant whatever the duration of the stimulus, and the liminal intensity being represented by a straight line parallel to the abscissa or axis of time. Lapicque calls this intensity the rheobase. With currents of shorter duration the intensity and the time are definitely related; the shorter the duration the greater the intensity required to reach the liminal contraction and the steeper the curve. Now the relation referred to differs in different muscles, but it is found that the curves have the same form, and by adjusting the size of the diagrams the curves of two different muscles—for instance, the rapidly contracting voluntary muscle and the slowly contracting smooth muscle—can be made to coincide. In this case the abscissa or axis of time will indicate two series of durations, the unit of time employed for the rapidly contracting muscle being necessarily much smaller than that for the smooth muscle. If, now, a definite point in the curve is taken (Lapicque takes the point corresponding to twice the rheobase), the two readings on the abscissa corresponding to the ordinate of the point furnish a measure of the relative excitability of the muscles, or their chronaxy.

Lapicque mentions many directions in which the determination of the chronaxy may be employed in research. For instance, the auricular and ventricular myocardium exhibits a definite chronaxic relation to the auriculo-ventricular bundle, and poisons which affect the transmission of excitation between auricle and ventricle have a graduated activity corresponding to the chronaxy. It appears that variations in the dimension of the rheobase afford a means of studying the effects of poisons on the muscle. Further, the notion of chronaxy is applicable not only to the excitability of muscle, but also to that of every species of vital tissue.

NOTES ON BOOKS.

WISDOM, born of long experience and careful observation, is so rare in these days when the majority of our youth are being hurried along by short cuts to the acquisition of a specious knowledge, that its utterance is sure to be received with general acclamation. It is not surprising, therefore, that Dr. ROBERT HUTCHISON has been compelled to arrange for a second edition of his *Lectures on Dyspepsia*[7] only a couple of years after the original publication of the volume. There are few problems so puzzling to the general practitioner as the diagnosis of chronic abdominal disorders, and there are few books that will be so helpful to him as the present volume of lectures. We feel sure that all who read it will be grateful to the author.

Mr. J. W. N. SULLIVAN has two gods. Their names are Relativity Theory and Quantum Theory. In *Gallio, or the Tyranny of Science*,[8] one of the series of *jeux d'esprit* published under the general head "To-day and To-morrow," Mr. Sullivan sets forth his religion. We gather that his gods have the merit of being incomprehensible by the multitude, and that their origin displays the loftiness of human imagination. It appears also that Beethoven was an angel of light, while Freud is a minion of the Prince of Darkness. The idea that there is a conflict between science and art or mysticism rests upon an old-fashioned conception of the status of physics. Out-of-date science leads to conclusions which are depressing to the artist or the poet. The conception that the real universe is a four-dimensional world of point-events with a certain minimum amount of structure breaks up old habits of thought and rouses enthusiasm in the soul of the artist. As the conception of "purpose" in the universe seems to suppose a process in time, it may be a totally irrelevant idea when applied to reality. Could anything be more satisfying to a poet? Especially when he remembers how little we know of the possibilities of development of the human consciousness. After saying on one page that the proper attitude to-day to man's place in nature is one of bewilderment and humility Mr. Sullivan tells us on the next that he has shown that the philosophy which regards man as a meaningless accident in an alien universe receives no support from modern physics. Unfortunately, however, neither philosophy nor modern physics seems to give Mr. Sullivan an answer to his problem. All we learn is that a conclusion "cannot be transcended by a logical process, but only in virtue of a mystic experience." The old materialistic outlook, says Mr. Sullivan, is still active in many branches of science; but in the stuff of our ordinary experience, such as psychology, we do wrong to accept the obviously absurd for fear it cannot be as silly as it looks

[5] *Urinary Surgery*. By William Knox Irwin, M.D., F.R.C.S.E. Second edition, revised and enlarged. London: Baillière, Tindall and Cox. 1927. (Cr. 8vo, pp. viii + 271. 10s. 6d. net.)

[6] *L'Excitabilité en Fonction du Temps*. Par Louis Lapicque, D.M., D.Sc.Paris, LL.D., D.Sc.Oxford. Les Problèmes Biologiques. Paris: Les Presses Universitaires de France. 1926. (6 × 9½, pp. 371; 79 figures. 45 fr.)

[7] *Lectures on Dyspepsia*. By Robert Hutchison, M.D., F.R.C.P. Second edition. London: E. Arnold. 1927. (Cr. 8vo, pp. 200. 6s. net.)

[8] *Gallio, or the Tyranny of Science*. By J. W. N. Sullivan. To-day and To-morrow Series. London: Kegan Paul, Trench, Trubner and Co., Ltd. New York: E. P. Dutton and Co. 1927. (Fcap. 8vo, pp. 96. 2s. 6d. net.)

A great deal of psycho-analysis, he thinks, is so silly that only people deficient in common sense and lacking in a sense of humour could have invented it. From this it will be seen that Mr. Sullivan, as a priest of the new religion, does not feel bound to adopt the attitude of bewilderment and humility.

A manual on the *Principles of Physical Chemistry for Medical Students*[9] has been prepared by PHYLLIS KERRIDGE, M.Sc., who is an assistant in the department of physiology and biochemistry at University College, London. Physical chemistry is a little incongruous to the harmonic group of studies connected with biology, but yet is an essential requisite to medical education. The aim of the author, in recognition of this, has been to gauge carefully what is most necessary as well as sufficient for the medical student's purpose, and to save him from wandering farther afield from his main occupation than necessary. In this aspect the volume has been ably prepared; there is no lack of explanation nor any superabundance of words, and the book appears to give the student a very high rate of return for his effort of study.

Under the title of *The Fifth Avenue Hospital Clinics*[10] are collected reprints of articles previously published by members of the staff of this hospital in New York. The volume also includes informal addresses read at meetings of the staff in 1925.

Lovers of Surtees and Becford will find equal pleasure in reading *Letters on Hunting and the Management of Hounds*[11] by "Scrutator," a well known west country squire, by name K. W. Horlock, who for many years was master of foxhounds. The book is full of hints on the management of hounds, and contains all that information which only one who has practical experience of mastership can furnish. It is admirably written, and is sprinkled with amusing anecdotes. In short it is a book that should be in every hunting man's library.

[9] *Principles of Physical Chemistry for Medical Students.* By Phyllis M. Tookey Kerridge, M.Sc., A.I.C. With an introduction by Professor A. V. Hill, M.A., F.R.S. Oxford Medical Publications. London: Milford, Oxford University Press. 1927. (Cr. 8vo, pp. xiii + 134; 22 figures. 5s. net.)

[10] *The Fifth Avenue Hospital Clinics.* First Series. New York: P. B. Hoeber, Inc. 1927. (Med. 8vo, pp. xiii + 336; 67 figures. 5 dollars.)

[11] *Letters on Hunting and the Management of Hounds.* By "Scrutator." Second edition. London: P. Allan and Co. 1926. (Demy 8vo, pp. xii + 308; illustrated. 12s. 6d. net.)

PREPARATIONS AND APPLIANCES.

Anti-gas-gangrene Serum.

AN anti-gas-gangrene serum (W) (*B. welchii*) has been prepared by Messrs. Burroughs Wellcome in view of the importance attaching to the presence of the causative organism of gas gangrene in some cases of peritonitis and acute intestinal obstruction. During the war the prevention and treatment of gas gangrene was, of course, a matter of everyday importance, and promising results were then obtained with serums. Suitable doses of the present serum are 80 c.cm. intramuscularly or 40 c.cm. intravenously.

VICHY, AND ITS WATERS.

BY

SIR JAMES BARR, M.D.

VICHY is situated near the geographical centre of France. The medicinal properties of its waters have been known from time immemorial, but the first successful impetus to its popularity was given by Napoleon III, who, with the Empress Eugénie, made frequent visits for treatment from 1861 to 1866. Since then the town has steadily grown in size and importance, and it is now the most popular health resort in Europe. Over 130,000 invalids come here for treatment every year—of these a very considerable number have paid several previous visits.

We may now inquire what solid foundation there is for this popularity. It is true that we find here all the amenities of civilized society, but these attractions are no greater, nor perhaps as great, as those to be found at many other health resorts. After careful observation one is forced to the conclusion that the great bulk of the visitors come seeking health or a restoration to health, and if they were disappointed they would not repeat their visits so regularly.

The town is situated on the right bank of the river Allier—a large and rapid stream; the domestic water supply is ample, potable, and is said to be about the best in France. There are forty mineral springs, but only about twelve are in common use. These waters are free, and are freely used, though a free gift is not always appreciated. However, everyone seems to take the waters religiously according to the prescription of his medical adviser. Almost on arrival everyone is advised to consult a local medical man, and it is difficult to get a bath of any kind at the Grand Thermal Establishment except on a medical prescription. This is a very wise precaution, as nothing could more readily detract from the reputation of the place than the indiscriminate use of the baths and waters. Vichy is well supplied with a large number of able medical men, to whom the success of the place is in no small measure due.

The Grand Thermal Establishment covers an area of nearly eight acres, and here baths of every description can be had. The mechano-therapy department is the best equipped that I have ever seen. The director, Dr. Haller, tells me that during the height of the season the clientele number 500 daily. This gives some indication of the number of damaged joints to be found in Vichy.

Dr. Félix Ramond of Paris in a recent article gives a glowing account of the mineral waters of Vichy, how they are formed deep down in the crust of the earth by the union of hydrogen and oxygen given off from the incandescent mass of metallic oxides. As the vapour gives off its latent heat it becomes condensed into water, which travels in various cracks of the earth to the surface, absorbing various salts in its passage. The waters must certainly start from a hot area as, notwithstanding all the cooling process in the transit, the Chomel source records a temperature of 109° F. on reaching the surface. Personally I am more interested in the physical and chemical properties of the waters than in their origin *in inferno*. There are forty-three million bottles of Vichy water exported annually. The chief sources for export are the Célestins, the Grande Grille, and to a less extent l'Hôpital. I presume these waters are more stable than some of the others, and are thus not so apt to alter in transit. For use at the source the Chomel is most frequently prescribed. I shall therefore deal exclusively with it. It is the warmest, the temperature being about 104° to 109° F., and is quite palatable. The composition in grams per litre is: sodium bicarbonate, 5.6; potassium bicarbonate, 0.35; lithium bicarbonate, 0.012; calcium bicarbonate, 0.36; magnesium bicarbonate, 0.07; ferrous bicarbonate, 0.001; sodium chloride, 0.57; sodium sulphate, 0.28; silicon oxide, 0.06; free carbonic acid gas, 0.97. The salts seem to be in an active state of ionization—anions and kations. The electric resistance is eighteen times less, and the electric conductivity eighteen times greater than ordinary tap water. The water is isotonic with the blood serum, to which it supplies an abundance of buffer salts. On this account the normal hydrogen-ion balance of the blood is easily maintained without any incessant strain on the regulative mechanism of the body. As there is an abundant supply of free ions in the waters, large doses should not be required; in fact, this is corroborated by the experience of the physicians, who find that repeated small doses are more efficient than one large dose.

The bipolar theory of living processes which has been long held by many, and which has been recently adopted by the great American surgeon Dr. Crile, is in harmony with what I have written. If Dr. Crile be correct, as I believe he is, that the brain is the positive and the liver the negative pole of the principal electric circuit of the human body, then the liver regains the importance which was formerly attached to it in the human economy. The preservation of the functions of the liver is very essential for health, and this object is well attained by the treatment at Vichy. The principal diseases which are amenable to the Vichy treatment are functional and organic disorders of the whole of the digestive and urinary tracts, diabetes, metabolic troubles, diseases of the spleen, gout, rheumatism, and different forms of arthritis, uterine troubles, and numerous skin affections.

As I am anxious not to overstate facts I have submitted this paper to Dr. Monod, one of the leading Vichy physicians, and he has not found any fault in it.

A large number come here every year to recuperate after the dissipations of the London season, and as the new Pullman service has brought Vichy within fourteen hours of London, still greater numbers are expected this year.

British Medical Journal.

SATURDAY, JUNE 11TH, 1927.

PUBLIC CLINICS AND MEDICAL TRAINING.

AT its meeting in April the Council of the British Medical Association, approving a report with regard to orthopaedic clinics, pointed out that one of the dangers attending the establishment of such clinics is "the withdrawal of a large number of cases of a special type from those hospitals in which medical education is carried on in connexion with medical schools, so adding to the difficulties of securing an adequate knowledge of such conditions among medical practitioners in general." Last month the Council of the Society of Medical Officers of Health adopted a report on the instruction of medical students in ante-natal conditions and infant hygiene, embodying the results of an inquiry it had made as to how the requirements of the General Medical Council with regard to such instruction, and examinations in respect thereto, were being carried out by medical schools and qualifying bodies. These facts are evidence of increasing anxiety as to the situation which is rapidly developing, or at least may easily develop, in connexion with the multiplication of county or municipal medical services and the limitations which these tend to place on the full training and experience of the medical practitioner, both before and after graduation, which is necessary for the well-being of the public. This anxiety is by no means premature. There are now no fewer than seventeen departments, spheres, or directions of clinical activity for which provision is made in this sectional way under the auspices of local authorities. Some of these cover an extensive field of medicine; and in some there has arisen the ominous and increasingly insistent suggestion that the public needs can best be met by authorizing the placing of responsibility for giving advice and treatment upon persons other than qualified and registered medical practitioners. For instance, we have heard it claimed that midwives are quite capable of dealing with ante-natal conditions; that school nurses, under the purely nominal supervision of a medical officer, may safely be left to treat what are called the "minor ailments" of school children; and that dentists, rather than medical practitioners, should be entrusted with the administration of certain classes of anaesthetics. The pretensions of some opticians, now being pressed with a good deal of parliamentary sympathy, are especially dangerous. They are asking that the State should officially recognize them and register them as being the most skilled, if not the only legitimate, practitioners in an extensive field of ophthalmic treatment, and that their certificates within this field shall be, under statutory compulsion, recognized by "any local or central authority or Government department in any part of Great Britain."

Two interlocked vicious circles are, in fact, being established. There is danger that medical students may be imperfectly instructed in some part of their work owing to the withdrawal of special types of case to the clinics of local authorities, and there is danger that it may become difficult properly to staff those clinics owing to imperfect training of medical students. There is danger that unqualified persons may be officially recognized in certain fields of medical work owing to alleged insufficiency in the supply of competent medical practitioners, and there is danger that a progressively smaller number of qualified medical practitioners will cultivate those fields owing to their remunerative clientele being seriously diminished by the official recognition of the unqualified persons. If Parliament, the Government departments concerned, the local authorities, and the powers within the medical profession are wise, however, it is not yet too late to avoid these dangers.

There is no pretence, of course, that a medical student, on passing his qualifying examination, has become a wise practitioner, or is specially skilled in any particular branch of his profession; but his training and knowledge should even then be such that he can safely undertake many kinds of medical and surgical work, that after relatively short further experience he can properly assume considerable responsibility in one or other of the local government medical services, and that he will be in a position fully to profit by increasing experience, whether in such service or in private practice. It is the business of the General Medical Council, so far as possible, to see that a suitable kind of training and the requisite degree of knowledge are secured to the student, and it is the business of the medical schools and examining bodies to give the training and test the knowledge in accordance with the requirements of that Council. In the year 1922 the General Medical Council prescribed a readjustment of the medical curriculum, to come into force at the beginning of the following year. In this readjustment, among other things, increased emphasis was placed upon sufficient opportunity being afforded for the study, both theoretical and clinical, of those subjects which are now so essential in connexion with the treatment centres of a local authority, such as ophthalmology, venereal diseases, orthopaedics and mechano-therapeutics, infectious fevers, anaesthetics, ante-natal conditions, and infant welfare. In any judgement upon present conditions it must be remembered that no qualifying examination based upon this readjusted curriculum can take place until next year, and that it is not unreasonable to expect that, as the result of the maturing of this course of study, recruits to the profession will be found thereafter to be more abundantly proficient in these respects. Time has now been given for the universities, schools, and examining bodies to adjust themselves to these requirements, and we understand that an inquiry by the General Medical Council as to how far this has been done is now almost completed. It is expected that the results of this inquiry will be made public either in November next or early next year. In view of this it is not surprising that the inquiries previously referred to as having been made by the Society of Medical Officers of Health should have met with a very partial response. It is not unlikely that the bodies of whom inquiry was made regarded this rather as the business of the General Medical Council than of that society.

It is unfortunately true that a perfect prospectus and syllabus may mask very imperfect educational methods; but it is also found that a prospectus which is open to adverse criticism is in practice not incompatible with really full and excellent teaching. However this may be, the requirements have been laid down, and proceedings are being taken to see that they are actually fulfilled. Where a municipal centre or clinic is being conducted within a teaching hospital there should be no real difficulty in the student being instructed at such a centre, under conditions which

will allow of the prime purpose of the centre being respected. Where the municipal or county provision is made elsewhere, it behoves the university or teaching hospital and the local authority to agree upon suitable facilities being allowed whereby the best use will be made of such material as is available for teaching purposes. Sufficient attempt has not yet been made in all cases to do either of these things.

The method of staffing such clinics as are not within teaching hospitals, and the use that is made of them for gaining post-graduate experience, are important alike to the public and to the profession. If they are staffed by whole-time medical officers, the experience which they afford is so far withdrawn from the sphere of private medical practitioners, and this has an immediate and adverse reaction upon the competence of such practitioners to deal with similar conditions among the general public. It is the policy of the British Medical Association that this work should, wherever possible, be done by the private practitioners of the locality under suitable arrangements and with the general administrative supervision of the medical officer of health; the character of the work is such that as a rule it can be done at least as effectively by such practitioners as by a whole-time officer. Where for some reason such an arrangement cannot be made, the practice of the clinics should certainly not be closed to such practitioners as wish to observe it. No organization can assist the making of such arrangements as these more powerfully than the Society of Medical Officers of Health, and it is to be hoped that, in the general interest, that society and its individual members will use their influence, both to secure for teaching purposes the opportunities afforded by clinics, and to facilitate the private practitioner obtaining to the fullest extent the advantage of the occasions for gaining experience which they offer. In this way fields of practice which are at present threatened will be preserved to the profession, much to the advantage of the public health.

OPTICALLY ISOMERIC SUBSTANCES IN BIOLOGY.

ONE of the last, if not the last, of the contributions to current medical discussion made by the late Professor A. R. Cushny was contained in the Dohme memorial lectures delivered at the Johns Hopkins University School of Medicine in 1925. Early in the following year he died, to the great loss of scientific medicine. The Dohme lectureship was founded in memory of Mr. Charles E. Dohme, a member of a chemical firm in Baltimore, who, Professor Cushny said, in the preface to the volume in which his lectures have now been embodied,[1] was a man "of wide views and interests, who recognized the importance to industry of the advance of scientific investigation." The purpose of the lectureship is to promote the development of a more intimate relation between chemistry, pharmacy, and medicine, and it will be agreed that the choice of Professor Cushny as spokesman for pharmacology was singularly happy. Pharmacology, in so far as it is the handmaid of medicine, may properly be described as an applied science. Nevertheless, its roots are deep in the academic problems of pure chemistry and physiology, since its enterprises must ultimately be directed towards relating the physiological action of substances to their chemical constitution.

[1] *Biological Relations of Optically Isomeric Substances.* By Arthur R. Cushny, M.D., F.R.S. London: Baillière, Tindall and Cox. 1926. (Demy 8vo, pp. ix + 80; 4 figures, 7 tables. 9s. net.)

Professor Cushny took for his subject the specific action of optically active isomers. No conception of the structure of matter has so enlightened and confirmed confidence in the atomic theory as has that of the spatial orientation of valency forces and its corollary the optical activity of the asymmetric carbon atom. The success with which it has been applied to the most complex problems in chemical constitution has lifted the atomic theory from the position of a convenient language for the expression of reaction to a plausible projection of the actual structure of matter in space. The phenomenon, at the same time, occupies a unique place in the chemistry of living systems, since it marks the one complete failure in the attempt of the organic chemist to imitate the activities of living matter. Whilst the factories of the living cell continue to exhibit a high degree of selectivity in the elaboration of optically active forms the chemist has failed completely to effect an asymmetric synthesis of a stereo-isomer.

This failure is fundamental to physiology, as Pasteur recognized when he argued from the asymmetry of vital activities a fundamental asymmetry of life itself. Professor Cushny took up the story and reviewed the evidence, now more complete, for asymmetric selectivity in biochemical phenomena, in the metabolism of the whole organism, in the pharmacology of isolated organs, and in the field of enzyme activity. He pointed out that whereas the proofs of biological specificity are overwhelming, it is by no means certain that the ability of living systems to discriminate between optically active forms is absolute. On the contrary, the distinction probably represents only a relative difference in the velocities of controlling chemical processes, though these are, in general, so great as to lead to pronounced physiological contrasts.

The examples to which the fullest consideration was given are those that were disclosed by Cushny's own work on the pharmacological action of the hyoscyamines, hyoscines, and adrenalines. The results are of great interest alike to the biologist and to the chemist. In conclusion, Professor Cushny tentatively approached the fundamental problem of the physiological significance of these phenomena. Time will probably justify his inclination to find their explanation in some manifestation of asymmetric surface forces, although no clear case has yet been demonstrated of a specific asymmetric adsorption. The experiments of Porter on the selective staining of wool by optically active dyes have been questioned and require confirmation. The analysis which Professor Cushny made of the relation between the constitution of the drugs studied by him and the possible chemical characteristics of their receptors in the cell are of real interest when read in the light of recent views of the chemical structure of surfaces and the orienting effect of surface forces.

Professor Cushny's lectures breathed the wide vision and deep insight of a great investigator of vital phenomena.

THE new form of death certificate which was, by the courtesy of the Registrar-General, discussed by the Medico-Political Committee of the British Medical Association at its last meeting, is now ready, and will come into use on July 1st. This will entail certain modifications in the procedure of death certification, designed to ensure greater accuracy in the national record of causes of death. A full account of the details and object of the new form will be given in an early issue of the BRITISH MEDICAL JOURNAL.

EXPERIMENTS ON DOGS.

A MEMORANDUM by the Medical Research Council on the Dogs' Protection Bill has been issued as a White Paper.[1] In the first paragraph the Council recalls that it is a body charged with the responsibility of applying moneys provided by Parliament and from other sources to the promotion of medical research, and states that the proposals of the bill "would place an insuperable and permanent barrier across some of the chief paths of progress in this work." It then proceeds to set out special reasons which make it necessary that dogs should not be excluded from that service to mankind in which animals have so greatly aided the advancement of medical science. "It is," the memorandum states, "beyond dispute that the present-day science and art of the physician and surgeon have been founded in large part upon the experimental use of dogs in the past. It has been by the use of dogs that the chief foundations of our knowledge of the processes of digestion, the circulation of lymph, the work of the heart, and the circulation of the blood have been laid. Large and essential parts of our knowledge of the science of feeding are based upon the results of trials made in the feeding of dogs. The work of the surgeon, whether upon the brain and spinal cord, or upon the intestine, or upon the chest, has been made possible by experiments upon dogs. Methods of life-saving, as by the transfusion of blood, or in the resuscitation of the apparently drowned, have been worked out chiefly by trials with dogs. Important parts of our knowledge of anaesthetics and their safe administration, and of the actions of many kinds of drugs, have been gained by the experimental use of dogs. There is no medical practitioner who does not use in his daily work information which he owes to experiments on dogs. If he is to understand the meaning of such common symptoms as palpitation, breathlessness, giddiness, fainting, and many other forms of distress, if he feels a pulse or listens to the chest, if he transfuses his patient with blood, or employs rectal feeding, he is making wholesale use of knowledge derived from experiments upon unconscious dogs." In the next paragraph the reasons which have made it necessary, and will always make it necessary, to use dogs for some of this experimental work are set out. Mention is made first of considerations of size, and it is observed that in this respect the only animals giving a practical alternative are the sheep, the pig, the goat, or the ape. The dog, unlike these animals, can be kept completely healthy and comfortable in a laboratory, and is not afraid of close and friendly observation. His long domestication has assimilated his natural diet to that of man, and many of his bodily structures provide the nearest approximation among available animals to those of man. The study of diet, and the collection and chemical examination of the excreta, can be carried out readily in the dog, and the results are in the main directly applicable to man or the child. Dogs are, therefore, used for certain experiments, though only in a small minority of instances; but it is plain, the Medical Research Council holds, that the selection of the animal most fitted for the special purposes in view must be left to the discretion and skilled knowledge of the workers in medical science. The Council then goes on to give some instances of recent advances in knowledge due directly to experiments on dogs. In this connexion it refers to rickets, disorders of the teeth, the effects of alcohol, to the study of diseases of the heart and circulation, and to diabetes. The members of the Council, speaking with knowledge—in the case of many of them with intimate knowledge—of the actual conditions under which experiments upon dogs are performed in this country, assert confidently that in the vast majority of such experiments no pain at all is inflicted. The experiment or the observation is either made wholly under an anaesthetic and death produced without awakening, or the experiment is a feeding experiment. In a small minority of cases, where for special reasons and under a special certificate recovery after operation is allowed, there is rarely any condition of pain as distinguished from discomfort. A paragraph of the memorandum is devoted to the benefit to dogs derived from research; special reference is made to the study of distemper, to the prevention and treatment of spirochaetal jaundice, and piroplasmosis (malignant jaundice) in dogs, by which the lives of practically 100 per cent. of affected dogs are saved, while 80 per cent. die if left untreated. Moreover, the veterinary surgeon has gained from the experimental studies of physiologists the knowledge that dogs can be deeply anaesthetized with safety, so that operations on valued dogs can now be performed painlessly which were previously done on the conscious animal. The kind of propaganda by which most of the support gained for the Dogs' Protection Bill in and out of Parliament has been obtained is condemned; statements are made which are grossly misleading, and conceal the central fact that operational experiments are only performed under deep anaesthesia, and with the strictest precautions for the avoidance of suffering; the enormous diminution of bodily pain and mental suffering which the experimental use of dogs or other animals has already brought about is persistently belittled or denied. In this way absolutely groundless distress has been caused to very many unselfish right-minded men and women who have believed the tales or suggestions of cruelty made by the propagandists. Finally, the memorandum deals with the danger that stolen dogs may be sold for the purposes of experiment; this risk, it is pointed out, would become negligible if some of the many thousands of stray dogs that are unclaimed or abandoned were made available for painless experiment. The Council therefore urges that the Dogs Act should be amended by the repeal of the section which prevents the police from transferring stray and unsaleable dogs remaining unclaimed by any owner to a suitable authority established by the Home Office for the purposes of experiment under the existing law and Home Office regulations. It is reported that 50,000 dogs are destroyed annually in London under police regulations; these dogs either have no owner or their owners do not care enough about them to make inquiries when they are lost. The law should be so altered as to allow part at least of the now useless annual massacre of dogs to be turned to the permanent benefit of mankind and other animals. The memorandum is signed by the Earl of Balfour as chairman, by Lord Mildmay of Flete as treasurer, by Sir Walter Fletcher as secretary, and by all the other members of the Medical Research Council. It will be seen that the Medical Research Council is in complete agreement with the British Medical Association, and endorses the arguments it has put forward.

[1] The memorandum is addressed to the Lords of the Committee of the Privy Council for Medical Research (the Lord President of the Council, the Home Secretary, the Secretary for Dominion Affairs, the Secretary for the Colonies, the Minister of Health, and the Secretary for Scotland). It is a command paper (Cmd. 2880) presented to Parliament by the Lord President, and can be obtained from H.M. Stationery Office or through any bookseller. Price 2d. net.

INHERITANCE OF TUBERCULOSIS.

DR. PERCY STOCKS, medical officer of the Galton Laboratory at University College, has now published in the current (April) number of the *Annals of Eugenics* the fresh evidence obtained at the laboratory on the inheritance factor in tuberculosis. The work on which this paper was based was done partly by Professor Karl Pearson, but mainly by Dr. Stocks. Its object was to test views expressed by Sir Arthur Newsholme and others in support of Robert Koch's statement that "predisposition is merely proximity to the bacillus," and to strengthen the case for the hereditary

factor in tuberculosis. Carefully collected family histories of over 4,000 consecutive patients who attended the tuberculosis institutions in Belfast from 1914 to 1917 were examined, and the prevalence of active tuberculosis in Belfast and among brothers and sisters of patients attending tuberculosis dispensaries was ascertained in sex and age groups. From his figures Dr. Stocks considers that it is justifiable to draw the conclusions that at all ages after 10 years there is a fraternal correlation of the order 0.25 to 0.3; that these coefficients may be regarded as minimal values, and do not represent the full hereditary intensity; and that the coefficients show no consistent tendency to decrease after 10 years of age with advancing age of the pairs, as would be expected to happen if they arose from infection or environmental causes. During the first ten years of life Dr. Stocks thinks that an additional factor must be sought. He admits that this factor might be direct infection between young children, or a common source of infection in the home. The high correlations in early childhood lend support to the efforts that are being made in many European countries to protect infants in tuberculous families from sources of infection during their earliest years. But, as a convinced believer in the inheritance factor, Dr. Stocks advances another explanation, based on the fact that when a young child is reported tuberculous the tuberculosis officer is easily able to examine all its brothers and sisters; whereas with adults the officer has to trust to statements by the patient, who may have very imperfect information on the condition of his siblings in their childhood. While refraining from discussing Dr. Stocks's figures, we may perhaps remind our readers that French observers have been busy with investigations tending to show that a filter-passing virus of tubercle can be transmitted through the placenta.

THE OTHER USES OF X RAYS.

THE last social evening of the session was held at the Royal Society of Medicine on June 3rd, when Sir James and Lady Berry again received the Fellows and guests. The feature of the evening was a short lecture by Dr. G. W. C. Kaye, superintendent of the physics department of the National Physical Laboratory, on the non-medical uses of *x* rays. He prefaced his subject with a cartoon which he had unearthed from *Punch* of January, 1896, immediately after the publication of Roentgen's discovery. The cartoon showed John Bull confronting the then Kaiser, above a legend which ran: "Thanks to the discovery of Professor Roentgen, the German Emperor will now be able to obtain an exact photograph of a backbone of unsuspected size and strength"—a happy prophetic touch. Another cartoon, in 1923, showed a group of very transparent-looking American gentlemen, on whose persons, however, and among whose belongings certain dark shadows were revealed which had very much the shape of flasks and bottles. Dr. Kaye began the more serious part of his address by exhibiting a copy of the now historical radiograph of the hand taken by Mr. Campbell Swinton at the London Camera Club in 1896, with an exposure of twenty minutes. The skeleton was just discernible. This radiograph was, we believe, that reproduced in the issue of this JOURNAL for January 25th, 1896, shortly after Professor Roentgen had sent to Professor (now Sir) Arthur Schuster, who then occupied the chair of physics in Manchester, the first radiograms to reach England. It must be admitted that, as Dr. Kaye declared, the bones of the hand were barely discernible, but the print, it may be said without any desire to play upon words, foreshadowed the immense advances that have since taken place. How great they are is evidenced by the fact that sharp images of bones are now obtainable with an exposure of 1/100th of a second. One minor application of *x* rays, Dr. Kaye continued, is in the study of such fragile structures as flowers and shells; here, of course, very "soft" rays, excited by a low voltage, must be used. *X* rays can also be used to test the genuineness of jewels. Dr. Kaye said that a friend of his recently picked up in Oxford Street what he took to be a paltry trinket, but on subjecting it to *x* rays he found that the stones were genuine diamonds, for they appeared transparent, instead of opaque, as imitation gems would have done. To complete the story it should be added that he immediately took his find to the police station! The rays are now being applied in Scottish coal fields to determine in samples of coal the proportion of ash. Streaks of ash are shown clearly in a section of coal under the *x*-ray beam. Large quantities of ebonite are now used for wireless purposes, and it is important that the ebonite should be free from mineral matter; *x* rays show whether this is so or not. The rays are being applied to the testing of golf balls, to discover whether, as sometimes happens, the core is out of centre; the balls are rolled slowly before an *x*-ray apparatus, and any distortion of the core is immediately detected, thus preventing subsequent foozles or flukes. The *x*-ray picture of the electrically heated jacket of the air pilot shows the site of any broken connexion. Clinical thermometers are tested to determine the nature of the glass. They are placed on trays and passed through the *x*-ray beam, and the least expert watcher can pass the lead glass and reject the soda. The rays are also used in munition factories to detect, for instance, flaws in hand grenades and similar material. It can be shown by *x* rays whether the parts in a wireless valve are assembled with absolute correctness, and another use is the detection of knots and worm-holes in wood used in aeroplane construction. Art as well as industry is served by *x* rays. Dr. Kaye spoke of the assistance which *x* rays can give in testing the genuineness of old masters and of antiques generally. In the early ages of painting there were only eight or nine pigments, all of which are very opaque to *x* rays, whereas the modern pigments which the chemist has provided are very transparent. Not only can fraud sometimes be detected in this way, but in a genuine old work interesting revelations may be made, and various tentative sketches be brought to light which the artist evidently thought he had erased from the canvas. Dr. Kaye touched upon the science of *x*-ray spectrometry, and the addition which *x*-ray analysis had made to our knowledge of the atomic structure of the solid state of matter. The rays had demonstrated, for example, that almost every solid substance in nature showed crystalline form, including such unlikely materials as rubber, cellulose, the tooth, and the finger-nail.

THE BIRTH OF A PROFESSION.

IN an address delivered a short time ago to the Institute of Chemistry of Great Britain and Ireland, on the growth of the profession of chemistry during the past half-century, Mr. A. Chaston Chapman said that fifty years ago scientific or pure chemistry was not always on the best of terms with professional chemistry. Among those who followed chemistry as a profession or means of subsistence certain reprehensible practices were quite common, such as issuing laudatory reports for unrestricted publication, and touting. Moreover, much of the practice of the day was in the hands of men with insufficient training, so that work under such important statutes as the Sale of Food and Drugs Act of 1875 often found its way to persons with a meagre knowledge of chemistry. The foundation of the Institute of Chemistry in 1877 was the first step towards placing the profession of chemistry on a proper basis. It established professional cohesion; it offered the public a means of distinguishing properly trained men from imperfectly

trained men; and it introduced a code of professional ethics. The result has been, according to Mr. Chapman, that the general average of income for chemists is better than the average in other professions. Mr. Chapman dwelt on the importance of the chemist to the State in the work of various Government laboratories, and in the administration of such Acts as the Food and Drugs Acts. He showed how important chemistry is in most modern industries. He insisted on the need for the private or consulting chemist. In this connexion, as a convinced believer in individual effort, Mr. Chapman deplored the tendency to stamp out the independent worker. He expressed regret that whole-time municipal chemists were replacing "outside" men, and that large, and even small, industrial concerns now frequently employed their own resident chemist. In conclusion, Mr. Chapman pointed out that chemistry is one of the basic sciences, which has profoundly modified almost every department of human activity, and has made happier the daily life of every individual.

FREE POST-GRADUATE EDUCATION.

THE Medical Society of the State of New York is offering graduate education, without cost, to every physician in the State. Dr. Charles A. Gordon, chairman of the Education Committee of the medical society, has recently published an account of the origin and objects of this movement.[1] In the belief that responsibility for graduate education rests on organized medicine, which should assume leadership in the solution of public health problems, the Medical Society of the State of New York decided to carry education to those who were unable to leave their homes. During the past two years clinical lectures and demonstrations have been given in fifty-one of the sixty-two counties of the State by fifty or sixty teachers from the larger cities. In return for this service the teachers receive "the thanks of the committee, travelling expenses, and a small honorarium." The whole of the costs are met by the medical society and the State Department of Health, which has borne most of the cost of the lectures on obstetrics and pediatrics. The lectures are given on the same day for six or more successive weeks in the spring and autumn, and occupy one to two hours. No attempt is made to train specialists; the object is to raise the standard of practice in the community. The medical society believes that the majority of disease conditions yield to clinical diagnosis, which is still the most important factor in the practice of medicine. Consequently comprehensive laboratory courses are not included in the schedule. Alliance with medical schools and county medical societies is sought, and the plan is considered possible wherever there are hospitals and men willing and able to teach. The success of the scheme has been shown by the excellence of the attendance; in some instances men have driven sixty miles to the lectures. The altruism of the Medical Society of the State of New York, and of the teachers who accept emoluments consisting mainly of gratitude, is worthy of note. In propositions for post-graduate education it has usually been assumed that the general practitioner will be ready to sacrifice, not only time, but money, in the attempt to improve his knowledge of disease. From the practical point of making a livelihood it is possible that the average practitioner may be doubtful whether the sacrifice is worth making, especially in view of the educational facilities offered by medical journals and by meetings of medical societies. Although it is generally held that what is worth having is worth paying for, yet the gentle art of advertisement teaches us that free distribution of a commodity may do much to popularize its use. Under skilful and enthusiastic organizers much might be done to redeem post-graduate education from failure. The experiment of the Medical Society of the State of New York in bringing free continuous education to the door of the general practitioner will be watched with interest.

[1] *Journ. Amer. Med. Assoc.*, April 30th.

INTERTRACTION.

A POPULAR remedy for boils is to "draw" them by applying a soap-and-sugar plaster; a copious welling-up of lymph from the subjacent tissues follows the application. Pondering over this phenomenon, Sir Almroth Wright surmised that "drawing" was possibly a not inappropriate designation for the process involved, and that the constituents of the plaster might actually exert traction on the lymph; he discovered that a solution of salt was as good a "drawing agent" as soap-and-sugar plaster, and thereupon instituted experiments on the intermingling of fluids, culminating in the practical application of hypertonic salt solution in the treatment of wounds, with which every surgeon is now familiar. Apart from this utilitarian result, there remained the theoretical problem of isolating and examining the supposed force of traction—or rather intertraction, since it seemed that the action must necessarily be reciprocal between the two fluids concerned. To the solution of this problem Sir Almroth addressed himself, planning a series of experiments of great simplicity and beauty, the descriptions of which will be found in the *Proceedings* of the Royal Society, B, vol. 92 (1921), and A, vols. 112 (1926) and 114 (1927). The thesis submitted to the test of experiment was that in the intermingling of a solution of salt with an albuminous solution of lower specific gravity, or with water, there comes into play, in addition to the forces of gravitation and diffusion, a third force *sui generis*—namely, "intertraction." The following experiment was regarded by Sir Almroth Wright as proving the existence of this force, and also its independence of gravitation. Two vessels, one containing strong salt solution and the other water, were connected by a syphon tube threaded with wick, the end of the tube dipping into the salt solution being closed with a tight cotton-wool plug. It was found that the water slowly passed into the salt solution, showing that the salt, provided that it were even lightly confined, exerted traction, and exerted it against the opposition of gravity. When an albuminous fluid was used instead of water, a more rapid and voluminous indraught of fluid into the salt occurred. Having thus shown that intertraction could not be explained as being merely a form of gravitation, it remained to show that it also differed essentially from diffusion, the only other physical force which effects the mingling of fluids. It was shown, by an experiment to be described, that intertraction is manifested in a manner totally different from that exhibited by diffusion. In diffusion the commingling is intermolecular and diffuse; in intertraction it takes the form of innumerable filiform fluid streams, which pass in both directions across the frontier of the contiguous liquids, can be rendered visible by suitable means, and have been compared by Sir Almroth to pseudopodia. A plug of cotton-wool soaked in an albuminous fluid stained with eosin was placed midway in a test tube; the lower compartment was filled, through a lateral opening, with a heavier saline solution, and the upper compartment with water. A rapid advance of coloured pseudopodia into the saline solution occurred, while the superjacent water above the plug remained free. In a companion experiment the salt solution was coloured instead of the plug, and in this case pseudopodia were seen advancing upwards from the surface of the former. Sir Almroth considered that diffusion could furnish no explanation either of the pseudopodial character or of the rapidity of the movement of inter-

penetration in these experiments, and that, as has been said, it was necessary to postulate a third force—intertraction—to explain the facts. Objection has been taken to this interpretation on the ground that at the moment of intermingling there may occur an interchange of salt and water between the two fluids, and that this would cause local changes in density, and thus, under the influence of gravity, initiate vertical currents such as would produce an appearance of pseudopodia. An experiment was therefore devised in which the production of these currents would be excluded. Three or four discs of filter paper infiltrated with an albuminous fluid coloured with aniline were placed one upon another between two glass slides, which were firmly clamped together and then immersed in a vessel containing saline solution of higher specific gravity than the albuminous fluid. By this arrangement vertical currents were excluded, but none the less coloured streamers radiated out horizontally from the edge of the discs. The above experiments, with many others of an analogous kind, are put forward by Sir Almroth Wright as demonstrating the operations of intertraction, and they furnish, in his judgement, conclusive proof of the existence of such a *vis operans*.

EDINBURGH ANNUAL MEETING: HONORARY DEGREES.

On the occasion of the Annual Meeting in Edinburgh of the British Medical Association the University will confer the honorary degree of LL.D. upon the following distinguished members of the medical profession: Lord Dawson of Penn; Professor Archibald Donald (Manchester); Dr. Charles E. Douglas (Cupar); Sir William Hale-White; Mr. Robert G. Hogarth (Nottingham), President of the British Medical Association; Dr. William Hunter; Professor T. H. Milroy (Belfast); Sir Berkeley Moynihan (Leeds), President of the Royal College of Surgeons of England; Sir John Herbert Parsons; Sir Humphry Rolleston (Cambridge); Dr. George Frederick Still; Mr. Wilfred Trotter; Sir Almroth Wright; Professor Vittorio Ascoli (Rome); Professor Jules Bordet (Brussels); Professor Harvey Cushing (Harvard University); Professor Charles L. Dana (Cornell University); Professor Knud Faber (Copenhagen); Professor Jan van der Hoeve (Leyden); Professor Otto Meyerhof (Berlin); Professor Otto Naegeli (Zürich); Emeritus Professor William S. Thayer (Johns Hopkins University); and Professor Théodore Tuffier (Paris). The ceremony will be held on Wednesday, July 20th, in the McEwan Hall.

LUNACY LAW AND ADMINISTRATION.

The Council of the British Medical Association, at its meeting on Wednesday last, had before it a draft report from its Committee on Lunacy and Mental Disorder dealing with the recommendations of the Royal Commission on Lunacy. The Council did not see its way to adopt the report in the form in which it was presented, and therefore did not come to an immediate decision. It instructed the committee to reconsider certain details of the report, and requested the chairman of the committee to circulate on its behalf the revised report to Representatives as a confidential document, in order that it may form the subject of a discussion at the Representative Meeting in Edinburgh next month. Among the references to the committee was an instruction to consider the situation that had arisen as the result of the findings of the jury in the case Harnett *v.* Fisher. The long-drawn legislation in this case was finally brought to an end by the decision of the House of Lords, fully reported in our issue last week (p. 1036). That decision turned wholly on a point of law, as is fully explained in an article published this week (p. 1084). We also printed last week a report of the finding of the jury at the rehearing of the case de Freville *v.* Dill, in which the jury found for the plaintiff, assessing damages at £50. The summing up of Mr. Justice McCardie, who heard the case, will have been read with particular interest by members of the medical profession. He observed that it was a serious matter that the Lunacy Acts contained no definition whatever of insanity, of unsoundness of mind, or of lunacy; they provided no test, set no standard, and gave no guidance in these matters. He added that a doctor called in to deal with an alleged lunatic was dealing with the most difficult subject known to the medical profession. Mr. Justice McCardie, having in mind the decision which was being delivered on the same day by the House of Lords in Harnett *v.* Fisher, deferred judgement. We understand that it will be delivered during the next sittings, which begin on June 14th.

PROFESSOR PAVLOV.

There will be found in this issue (p. 1070) a further and penultimate instalment of the series of articles entitled "A medical review of Soviet Russia" which Dr. Horsley Gantt has been contributing to our columns; this instalment deals with some of the recent work of Professor Pavlov, and we regret to learn that that distinguished physiologist has since last February been confined to his home. For over a year he has suffered from fever and indigestion, and a diagnosis of cholelithiasis was made. Professor Pavlov was submitted to operation under chloroform on May 27th. A stone was found and removed, and drainage inserted. Everyone will join with us in wishing him a speedy recovery. In April last he told Dr. Gantt that the two chief objects he now had in mind were to write his autobiography, embodying his general views of life, and his impressions of recent events; "these," he wrote, "I have viewed not from beneath, but from above, as I was not crushed by them."

The Duke of Connaught will distribute the prizes at St. Thomas's Hospital on June 21st at 3 p.m. On his arrival at the hospital His Royal Highness will unveil a tablet on which are inscribed the names of those of St. Thomas's Hospital who fell in the great war.

The Annual Oration before the Medical Society of London will be given on Monday next, June 13th, by Professor Harvey Cushing, M.D., F.R.C.S., of Harvard University, whose subject is the surgical aspects of acromegaly. The guests will be received by the President, Sir Humphry Rolleston, Bt., at 8.30 p.m., at the society's house in Chandos Street. The oration will follow at 9, and afterwards there will be a conversazione.

In connexion with the celebration at Guy's Hospital on July 8th of the centenary of the discovery of Bright's disease by Dr. Richard Bright, the Royal College of Physicians of London, of which he was a Fellow, will give a conversazione in the evening.

On the occasion of the ceremony at the University of Sydney, when the honorary degree of LL.D. was conferred on the Duke of York, a portrait was unveiled in the Great Hall of the University of Sir Alexander MacCormick, for many years lecturer in surgery at the University of Sydney.

A MEDICAL REVIEW OF SOVIET RUSSIA.

VI.—WORK OF PAVLOV AND OTHER SCIENTISTS.*

BY

W. HORSLEY GANTT, B.Sc., M.D.VIRGINIA.

(Formerly Chief of the Medical Division of the American Relief Administration, Leningrad Unit.)

PART I.—PAVLOV.

LITTLE is known in other countries—especially in England and America—of medical work in Russia. This is not only on account of the language difficulty, but because of the lack of intercourse with other nations, and of the small number of foreigners who enter the country to do research work. Even before the war few doctors visited Russia. During three years of my stay there (1922-23, 1925-27) I have known of no other foreigner from an English-speaking country doing medical work, and I met only one such visitor prior to the summer of 1926—Mr. T. R. Parsons, then of Cambridge, now of Montreal. During the summer of 1926, however, there were several British and American doctors travelling through Russia (Dr. C. P. Miller of the Rockefeller Institute and others).†

Because of this lack of information I shall give a sketch of some of the important medical work with which I have become personally acquainted, without attempting, of course, a comprehensive review. My excuse for presenting this miscellaneous and sketchy account is the fact that practically none of the material, to my knowledge, has been published in English, and parts of it have not yet appeared even in Russian.

First of all is the work of Pavlov. His researches in digestion have already been published in English.‡ His energies during the last twenty-five years, however, have been directed chiefly to the physiology of the brain. Since two of his books are to appear soon giving his own account of the achievements in this new field, I shall do little more here than call attention to these volumes.§

CONDITIONED REFLEXES IN THE DOG.

More than a quarter of a century ago Professor Pavlov began his observations on conditioned reflexes. During his work on the digestive glands he and other physiologists had observed a secretion of saliva which physiology could not explain—a secretion when the dog looked at food or even when it heard the footstep of the person who fed it. Secretion of saliva when the dog ate, or when artificially stimulated by an electric current, was explained by physiology as chemical or physical reflexes, but the secretion at the sight or thought of food was considered *beyond* physiology: it was called psychical.

However, Pavlov was not satisfied with so vague an explanation. He felt that this important fact, and other psychical ones, should be reduced to physiological and measurable terms.

For two years Pavlov could not decide whether or not to abandon the former psychological and (to him) barren explanation of the psychical flow and to launch out into a new and unexplored field of objective investigation.

"After persistent deliberation on this subject, after a considerable mental conflict, I decided finally, in regard to the so-called psychical stimulation, to remain in the role of a pure physiologist—that is, of an objective observer and experimenter, having to do exclusively with the external phenomena and their relations."

Professor Pavlov gives the following paragraph of definition of conditioned reflexes (*Conditioned Reflexes*).

"From the point of view of an objective observer all nervous activity of the dog . . . appears to us as reflex—that is, a reaction of the animal to the external world through the nervous system. We classify reflexes into two orders. The simple former 'reflex,' which we call unconditioned—this is a reaction in which an external phenomenon is united with a certain response of the organism by a constant and unalterable connexion. For example, every time a mechanical body impinges on the eye, there follows without fail a defensive movement. . . . From these old reflexes we distinguish a new series . . . where the union of the external phenomenon with the corresponding activity of the organism is of a temporary nature, is formed in the presence of certain conditions, continues in the presence of those or other conditions, and under certain other circumstances, can be later destroyed. Thus we differentiate between constant and temporary reflexes."

Afferent stimuli reaching the brain may produce either a motor or secretory effect. Pavlov used the latter and selected the salivary gland for several reasons: because of the ease with which its secretion can be collected, and because of its comparatively few nerve connexions with other centres. Although various animals may be used for conditioned reflexes Pavlov has chosen the dog.

The presence of food in the mouth of a dog produces a flow of saliva. This secretion is dependent upon a nervous connexion with which the dog was born: it is an unconditioned reflex. The sight of food also produces a secretion of saliva, but because it has, during the life of the individual dog, often been associated with the eating of food. This flow is a conditioned one—Pavlov's conditioned reflex. The *sight* of food is a *conditioned stimulus*.

But other stimuli than the sight of food may be made the signal for the eating of food—a bell, a light, a touch on the skin, an odour, etc. When these are used for the first time they have no specific effect, and are called *indifferent* stimuli.* They must be connected with the unconditioned stimulus (food) by a number of repetitions in which they precede the giving of food. After this they acquire the property of causing a flow of saliva of themselves—before the food is given. They are now positive conditioned stimuli. They are conditioned because they may lose their acquired property if they are not accompanied by the *unconditioned stimulus*—food.

Besides the *positive* conditioned stimulus and the indifferent stimulus, there is the *negative* conditioned stimulus. For example, suppose a metronome of 100 beats has been made a positive conditioned stimulus, then just after metronome 100 is put into motion the dog is fed, and this connexion is repeated, say, fifty to a hundred times, until the dog begins to secrete saliva when the metronome begins—before he gets or sees the food; then let another metronome of 50 beats a minute be started—the dog begins to secrete saliva because of its resemblance to the first metronome 100. But if this metronome 50 is often repeated without food, it produces less and less saliva with each repetition and becomes a negative conditioned stimulus. *Inhibition* is set up in the dog's brain which prevents a flow of saliva. Thus this agent has an action opposite to that of the positive conditioned stimulus.

In order to form conditioned reflexes the operator and the dog sit in adjoining but separate rooms. The dog does not see the experimenter, who gives the various stimuli by means of pneumatic devices on the outside of the dog's room, having (electrical or pneumatic) connexions through the walls. The food is given and removed automatically, and the flow of saliva is measured by sealing a glass "balloon," hermetically, over an artificial opening of the salivary duct from the parotid gland. This "balloon" has two glass tubes leading off from its sides. The lower one is closed except when the accumulated saliva is suctioned off. The upper tube communicates with a manometer in front of the operator on the outside of the dog's room. As every flow of saliva into the "balloon" increases the pressure, the fluid in the manometer is forced along a scale whose divisions correspond to 0.01 c.cm.

Professor Hanicke in Pavlov's laboratory has perfected an apparatus for recording electrically the flow of saliva on a smoked drum. The fluid in the manometer is an electrolyte; it is forced out so that each drop as it falls makes

* Section V of this series, entitled "The Medical Profession, Soviet Science, and Soviet Sanitation," was published in the JOURNALS of January 29th and February 5th, 1927, at pages 198 and 244 respectively.

† Among those I saw was a young American physiologist, who, having convinced himself of the importance of Pavlov's investigations, determined to see them at any cost; having waited all the summer for an entrance visa, he found it necessary to abandon his trip to the Stockholm conference, and had means to remain only ten days in Russia—his entire European sojourn—but with the satisfaction of having seen first hand the laboratory and methods for which he had sacrificed a summer and travelled 14,000 miles. The visitor returned to America penniless.

‡ I. P. Pavlov: *Work of the Digestive Glands*, Lippincott, 1910.

§ One of these, *Activity of the Cerebral Hemispheres*, Pavlov has written expressly for the English language, and, as he told me, to pay a debt of gratitude which he owes to England and to America for their help to his country during the famine. It is being translated by Dr. G. von Anrep, and will be published by the Oxford Press. The other, *Conditioned Reflexes*, is also in course of translation, and is to be edited by Dr. W. B. Cannon of Harvard.

* These stimuli, though indifferent for the food reaction, are not entirely without effect, for they call out, when first used and before they have a specific action, the focusing or investigating reflex.

an electrical contact between two electrodes. At the closing of this fluid switch the needle makes a mark on the drum. The needle moves on a horizontal thread parallel with the drum so that the record is continuous. Thus what the psychologist might term the thoughts of the dog on hearing a bell or seeing a light which has been associated with food (or, in Pavlov's terminology, its reaction to a conditioned stimulus) is literally written down by a purely mechanical method, by a needle moved by electricity—a brain process of the animal transferred to paper, without the intervention of the experimenter—by an entirely objective method.

For many experiments with conditioned reflexes no special precaution is taken to isolate the dog from the operator and the outside world. For some experiments, however, in which very faint sounds, etc., are used, isolation of the dog is carried to a high degree. In Pavlov's new laboratory, which was begun before the war but is only just now completed, this isolation is accomplished in the following way. The whole building is surrounded by a trench filled with sawdust to dampen vibrations coming through the ground. In order to separate the experimental rooms as widely as possible, they are situated only in the four corners and on the first and third floors—none on the intervening story. Each experimental room has walls two feet thick, and double iron doors padded with rubber. This room, in which the operator sits, has ground-glass windows, so that his attention is not distracted by looking out of doors. The entrance into the dog's room or cabinet—another chamber within this experimental room—is through double or triple concrete doors, each one about four to six inches thick. They are padded with rubber and securely bolted during an experiment. The walls of the dog's cabinet consist of two or three concentric shells of concrete, each one four to six inches thick; they are separated by some porous material to prevent conduction of sound.

Every precaution is taken to eliminate adventitious sounds, which might spoil the whole investigation. For example, suppose the conditioned stimulus, the signal for feeding, is intended to be an optical one, a whirling figure. If the movement is accompanied by some noise, even too faint for the human ear to detect, the dog may react to the auditory component entirely, and the result obtained be that characteristic for ear stimuli and not for visual. This indicates the importance of mechanically perfect apparatus. The defect just referred to is now to be overcome by the projection of optical figures from the next room through a "port-hole" window on to a screen in front of the dog. All the apparatus used in Pavlov's work with conditioned reflexes has been devised with great ingenuity. Professor Hanicke, who has been with Pavlov for thirty-five years, and Dr. P. S. Kupalov, Pavlov's brilliant first assistant at the Institute of Experimental Medicine, have contributed much toward the perfection of the present apparatus and instrumentation.

The operator, sitting on the outside of the dog's cabinet, gives the desired stimulus (by pressing a rubber bulb, etc.), and he can see the animal through a periscope over a small glass window in the wall of the camera. Although the salivary reaction is mechanically recorded, it is sometimes necessary to observe the movement reaction, to see if the dog is sleeping, etc.

By his method of conditioned reflexes Pavlov thinks he has discovered the nature of sleep and of *neurasthenia*. Both of these he has produced artificially in his dogs, by giving them too difficult problems of differentiation. For example, suppose a tone of a certain pitch is made a positive conditioned stimulus, and another tone of a distinctly lower pitch is made a negative conditioned stimulus (that is, it is not accompanied by food), then let a third tone be taken so close in pitch to the first that the dog cannot distinguish between them; there results a lack of balance of the processes of stimulation and of inhibition, and the animal develops symptoms of neurasthenia, refusing to eat, whining, etc. Pavlov has cured such dogs by rest and bromides.

Not only has light been thrown on the processes of sleep and neurasthenia, but by means of this method work has been done on the localization of brain centres. For example, conditioned reflexes are formed from the eye, skin, etc., and after removing parts of the brain, the extent to which these conditioned reflexes are lost can be observed.

Pavlov believes that all acts are reflex. Thus he speaks of the *reflexes* of freedom of purpose in his book *Conditioned Reflexes*. In the first chapter of *Activity of the Cerebral Hemispheres*, he avers that there is no essential difference between reflexes and instincts. Such instincts as nesting he considers a chain of reflexes. He points out that we know of simple reflexes united in chains, where the end of one is the stimulus for the beginning of the next—for example, irritation of an afferent nerve gives an increase of blood pressure, the high blood pressure in the aorta irritates the ends of the nervus depressor cordis, which neutralizes the effect of the first reflex. He contends, further, that the other former distinctions between instincts and reflexes are only superficial.

Pavlov claims for his method that it is objective, in contradistinction to the methods of psychology, which try to discover the laws of the brain by subjective methods. He writes (*Conditioned Reflexes*):

"Physiology of the higher departments of the central nervous system cannot be otherwise than a study founded on a purely objective basis, and completely removed from the indefinite ideas of psychology. What interest, for example, for physiological analyses can come from the statement of authors that after extirpation of certain parts of the brain the animal becomes malicious, less intelligent, etc., when these characteristics appear very complicated, and themselves need an exact scientific analysis?"

A casual perusal of his books may give the impression that his materialistic methods and logic exclude idealism, art, religion, etc., but those who read more carefully will find that, in spite of his mechanistic theory of life, he does not belittle the existence of spiritual things. In *Conditioned Reflexes* (Chapter X) he says:

"I should like to anticipate what might be misunderstood in these statements concerning my views. I do not deny or gainsay anything which relates to the innermost and deepest strivings of the human spirit. I only defend and affirm the natural rights of scientific thought everywhere, and until the time when and where it is able to manifest its own strength."

Such exhortations as the following appear frequently (*Conditioned Reflexes*, Chapter XXVII):

"If every one of us will cherish this reflex [of purpose] within himself, as a precious part of his substance, if parents and instructors of all ranks would make their chief goal the strengthening and development of this reflex, if our society and state would provide ample opportunities for practice of this reflex, then we should become that which we ought to and can be, judging from many episodes of our historical life and a few strokes of our creative strength."

His high ideals and hope for the future of science are evident from the following paragraph, written at a time when famine and disease hung like a pall over his native land, and he himself was sorely distressed over happenings in his country.

"Gradually with the movement of our work forward, these [errors] appeared more rarely, and now I am deeply and irrevocably convinced that this path leads to the final triumph of the human mind over its uttermost and supreme problem—the knowledge of the mechanism and laws of human nature. Only hence may come a full, true, and permanent human happiness. Let the mind rise from victory to victory over surrounding nature, let it conquer for human life and activity, not only all the surface of the earth, but the waters beneath and the air above; let it transfer for its purpose prodigious energy from one part of the earth to the other, let it annihilate space for the conveyance of its thoughts—yet the same human mind led by dark powers to wars and revolutions with their horrors, not calculating the material loss and inexpressible pain, reproduces bestial relations. Only science, the exact science about the human himself, and the most sincere approach to it from the side of Omnipotent Nature, will deliver him from his present gloom, and will purge him from his contemporary shame in the sphere of inter-human relations." (*Conditioned Reflexes*, Preface.)

I shall take the further liberty to mention Pavlov's private views on two important subjects—religion, and the freedom of the will—which I have from him in personal conversations. Pavlov has stated in his public lectures that religion is the highest of conditioned reflexes and the one that distinguishes man from the beasts. In addition, I have heard him say that he considers life without religion very hard, in fact almost impossible for the mass of humanity; that personally, though not religious by nature, he envies those who are; that he has the highest respect for religion; and that if the doctrines of religion are taken

in their broad sense and not too literally, there is no essential conflict between it and science.

Pavlov has told me that, in his opinion, there is not at the present time freedom of the will in the absolute sense, although those who are educated, have travelled, and so on, apparently have some freedom of choice; that there will be real freedom of the will only when we understand the physiology of the brain. He says:

"As long as man did not understand the laws of Nature she was a mystery to him and he was her slave, but he has gradually passed from the position of slave to lord, and in direct proportion to his knowledge of the laws of Nature. I consider it parallel with the brain. Until he understands its physiology he cannot be free." (Personal conversation, April, 1927.)

Pavlov was 55 when he began this work on the brain. Now, at the age of 77, he is still working daily at it. He directs the work of fifty collaborators in three different laboratories, and six days in the week he is present there himself from 10 a.m. to 6 p.m., coming and leaving with military punctuality, and when necessary walking through the snow and ice.

CONDITIONED REFLEXES IN OTHER ANIMALS.

Conditioned reflexes have been formed by Pavlov's pupils, not only in dogs, but in such diverse animals as fish, mice, puppies, monkeys, and children.* The following apparatus is used for work with fish. The fish is suspended by a light clamp over its back, in a tank of water enclosed in a cabinet. Inside this cabinet are red and green electric lights, a metronome, etc. The unconditioned reflex is the motor response to an electric current sent through the clamp. The conditioned stimulus may be a light, a metronome, etc. A red light may be used for a positive conditioned stimulus (given before the electric current), and a green light for a negative conditioned stimulus (followed by no current). After a large number of trials the fish jumps (conditioned reflex) when it sees the red light (conditioned stimulus), but not when it sees the green. The conditioned and unconditioned stimuli and reflexes are recorded on a drum on the outside of the cabinet where the operator sits. (Work of Frolov.)

Mice.

The apparatus for forming conditioned reflexes in mice is very ingenious; it was perfected by Professor Hanicke in 1925. When a given bell sounds, the mice run to a certain place to get food, and in going there they have to cross a platform attached to springs. When they step on this platform the act is registered on a revolving drum. A revision of the former work on inheritance of conditioned reflexes is being carried out with an entirely new apparatus. The mice now receive all their food (twenty times during each night) preceded by the bell. It is all done mechanically, so that the presence of the operator is not required. A clock arrangement makes twenty electrical contacts during the night (the natural time for the feeding of mice), rings the bell, and a few moments later opens a valve which allows grain to drop into a certain compartment of each cage. When the bell rings there is a general migration of the mice into the "dining room." The mice never get food without the bell. Males and females are kept in separate cages, so that the number of oncoming generations can be carefully regulated. When an experiment is made the mice are removed to a special cage where the results can be registered automatically.

Puppies.

The apparatus for forming conditioned reflexes in puppies is the same in principle as that for mice. A metronome (conditioned stimulus) is started, and the puppy runs from his box across a gangway to a table on which is a basin into which milk pours from a reservoir. The operator and the reservoir for the milk are concealed behind a screen. The running of the puppy to the basin is a conditioned reflex—motor instead of the secretory used in the grown dog. The motor reaction is used in the puppy instead of a secretory because of the difficulty of keeping the puppy quiet in harness. When the puppy steps on the gangway this response, together with the time of action, etc., of the conditioned stimulus, are recorded on a smoked drum.

These methods, while showing the wide adaptation which can be made of conditioned reflexes, lack the exactness of the salivary reflex used in dogs. It is by this latter method that Pavlov has worked out his physiology of the brain.*

Observations on Children.

The work of Krasnogorsky in the Children's Clinic of the Medical Institute (Filatov Hospital) deserves mention here. Krasnogorsky is one of Pavlov's older pupils, and Professor Pavlov confers with him frequently in his work. He published his first observations on conditioned reflexes in children in 1907.† He has twelve doctors working under him on the subject, and three well equipped rooms for conditioned reflexes in children, and has received money from the Soviet Government for three additional ones.‡

The method used for children is as follows: the child lies upon its back on a pallet on the table, with a rubber bulb fastened under its chin. His mouth is placed directly under the opening of a metal funnel, so that the operator by pressing a button may cause a piece of chocolate confection to drop through the funnel into the child's mouth. The operator sits in a closet in the room from which he may see the child, but the child cannot see him. A metronome, a light, or irritation of the skin by the pressure of the rubber bulb attached to the arm or leg may be used as a conditioned stimulus, controlled by the experimenter sitting in the closet. The child is given no directions whatever. After making the conditioned stimulus, the operator presses the button, which allows the confection to drop into the child's mouth. After a few trials the child comes to expect food when he sees the light or hears the metronome, and he opens his mouth (conditioned reflex). The opening of the mouth compresses the bulb under his chin, which is pneumatically recorded on a drum before the operator. The normal child lies perfectly still on the little pallet for an hour or more with no attention from the experimenter.

To this motor conditioned reflex of the child Krasnogorsky has now (in 1926) added the secretory, as in the dog. A suction cup (as also used by Lashley in America) is fitted over the natural opening of the parotid duct, and the secretion of saliva is measured and recorded automatically on the drum, together with the motor response. Krasnogorsky tells me that he has found that the secretory reaction is parallel to the motor, and that he believes he has attained the full elaboration of this method for children.

Negative and positive conditioned reflexes have been formed, and the work of Pavlov on the dog has been more or less duplicated by Krasnogorsky on the child. Children develop conditioned reflexes much more quickly than the dog—ten to twenty-five trials, compared to the dog's thirty to one hundred; children retain them much longer and more strongly than the dog without intervening practice; they can be destroyed more quickly in the child—for example, when a positive conditioned stimulus is repeated several times without being supported by food. (Dr. Krasnogorsky showed me such an experiment in which the positive conditioned reflex disappeared after twelve trials unsupported by food—that is to say, the child which had a conditioned reflex (opening its mouth) on hearing the metronome because it received food (unconditioned reflex), ceased to open its mouth when the metronome was sounded twelve times successively without food.) Differentiation for musical tones, and skin stimuli, and differentiation in general, are much more delicate in the dog. Trace reflexes are more easily developed in the child. Synthesis is much better in the child than in the dog.

* Other workers, as Bekterev, have applied conditioned or association reflexes to adults, using a motor response of the finger, word association, etc., but as this is outside the work of Pavlov's laboratory and seems to be nearer to psychology than to physiology, a description is omitted here.

* Fursikov, who worked with Pavlov for ten years at the Institute of Experimental Medicine, is now investigating (at the new Brain Institute in Moscow) conditioned reflexes in monkeys. An account of this and further details of conditioned reflexes, were given in *Archives of Psychology and Neurology*, April, 1927, by the writer of this article.

† *Russky Vratch*, No. 36907 (Russian).

‡ For bibliography see the excellent review by Kroll, *Jahresberichte des gesamte Neurologie*, 1922; N. I. Krasnogorsky, *Revue de Médecine*, 1925; N. Krasnogorsky, Der Schlaf und die Hemmung, *Monatsschr. f. Kinderheilk.*, Bd. 25, p. 372.

Krasnogorsky's observations were made on children aged from 1 to 5 years. He has found it impossible to develop conditioned reflexes in infants less than two weeks old. In children under 1 year the mechanical irritation of the skin is not specific. The skin analyser begins to function at about three months. At the age of 7 months the child differentiates between red and white light, at 8 months between odours of camphor and eau-de-Cologne. The movement analyser appears at 6 months of age.

Krasnogorsky has shown the clinical importance of conditioned reflexes in denoting the disturbance between the balance of inhibition and stimulation. His work gives a rational basis for classification and treatment of neuroses. He suggests its use also as the basis for child education. Krasnogorsky in 1925 found by his method of conditioned reflexes that an idiot child in his clinic had a brain on the level of a fish—that is, it was as slow as the fish in forming conditioned reflexes. In myxoedema, epilepsy, and neuroses, internal inhibition develops in the child. Children older than 1 year may form internal inhibition. It is quickly elaborated and slowly disappears with time, but disappears rapidly if the conditioned stimulus is unsupported by food. Imbeciles develop conditioned reflexes with difficulty, but some neurotic children develop them more quickly and lose them more quickly than a normal child. Leonov in Krasnogorsky's laboratory found in rachitic children that the movement, taste, and smell analyser is disturbed; orientation and adaptation are weak; motor reflexes are slowly formed, but when once present disappear slowly.*

Trophic Nerves.

There has been no additional work on trophic nerves from Pavlov's laboratory since the account that was given in the BRITISH MEDICAL JOURNAL for September 20th, 1924 (p. 535). However, I have had pointed out to me in his laboratory several cases of eczema-like eruptions and ulcers in dogs suffering from overwork and neurasthenia.

POOR LAW REFORM.

IT has been known for some time that the Minister of Health has been in communication with those members of Parliament who constitute the Unionist Agricultural Committee with regard to modification of his proposed scheme for the reform of the Poor Law so far as rural areas are affected thereby. Last week there appeared in the daily press an announcement of the "scheme which has been agreed upon by a subcommittee of that body and by representatives of the Ministry of Health." This announcement has all the appearance of an official or semi-official communiqué. Yet its wording is, in one respect at least, extraordinary. It is stated to have been arranged that the Minister of Health shall circulate the scheme to the associations representing local authorities "as a basis of discussion between him and the local authorities, subject to the financial details being eventually satisfactory to the committee." Since when has a sectional group of members of Parliament been granted a limiting or controlling voice with regard to negotiations between a Minister and those whom he thinks fit to consult, or as to the form in which the Cabinet or a Government department shall present its proposals to Parliament?

The "main heads of the scheme" are given in the announcement, and considering all that has happened with regard to the published provisional proposals of the Minister, which have now been under discussion for a long time, they are sufficiently startling. They go far beyond a mere modification of those proposals to meet the circumstances of rural areas; and, though the changes they are intended to effect are not always very easy to grasp clearly, they appear to constitute a complete new scheme, in substitution for the previous proposals, and to involve an almost entire abandonment of the principles on which those proposals were based and of almost all the advantages which they were calculated to produce. Under the new scheme boards of guardians are not to be abolished; their mode of election in urban areas is merely to be indirect instead of direct, while the position of a rural district councillor as *ex officio* a guardian is to be universally confirmed. There is to be an adjustment of Poor Law areas so that each county borough shall be such an area complete in itself (the town council becoming also the board of guardians), that no such area shall be partly in one administrative county and partly in another, and that agreed modifications may be made in the boundaries of such areas within a county. It may be assumed that some adjustment would actually be made in most counties. Apart from such adjustments, and the abandonment of the *ad hoc* election in urban areas, however, no change of any great practical importance appears any longer to be contemplated.

All Poor Law institutions (workhouses, hospitals, schools, cottage homes, etc.) would be transferred to the county council or county borough council. Thus a county borough council would be the Poor Law authority, owning all Poor Law institutions within its area. Outside county boroughs there will be, first, local boards of guardians administering the Poor Law generally from their own offices, but not owning any institutions, and secondly, the council of the administrative county, not administering the Poor Law at all as was originally intended, but merely owning all the Poor Law institutions and apportioning the cost of their maintenance among the boards of guardians who use them, and being compelled to provide accommodation in all kinds of institutions on the demand of any board of guardians. The separate boards of guardians who use the institutions are to pay according to user, so that in practice what obtains generally at the present time will not be altered. The institutions, though owned by the county, will be maintained by the boards of guardians, and even now most boards who have superfluous accommodation take in boarders. Some economy will probably be effected in some agricultural areas where at present many Poor Law institutions are filled to only a small proportion of their capacity and so are being maintained at an excessive cost. It is proposed that the councils of counties and of county boroughs shall have power (but not the obligation) "to make provision for co-option, where desirable, on boards of guardians or on committees as the case may be, of women members and of persons experienced in Poor Law work." The management (but, as explained above, not the financial support) of transferred institutions will be in the hands of a committee of the county council. In most areas this will be complicated, as there may have to be separate committees for each institution, for the local board of guardians in whose area an institution is situated, by whomsoever it may be used, is to be entitled to one-third of the representation on the committee of management of such institution. Thus, in this respect the workhouse or other Poor Law institution will differ from the county asylum. Provision is, of course, to be made for the transfer and superannuation of existing Poor Law officers in accordance with established precedents.

The chief merit of the previous provisional proposals was that they constituted a great step towards the unification of health administration in each area, and made some advance towards a corresponding unification of educational administration. It was on this ground that, with some reservation on a few important points of detail, the British Medical Association has given these proposals its strong support in general. It will be seen that, should the new scheme be adopted instead, this main reform would be almost wholly abandoned. It is true that in county boroughs the town council would be the board of guardians, but the scheme contains no provision for the distribution of transferred functions to their appropriate administrative departments—health services to the medical officers and public health committee, education services to the education officers and education committee, and so on. Outside county boroughs there would no longer be any pretence of such unification. There would be no provision for transferring to large non-county boroughs or urban districts

* For further description of conditioned reflexes in neurotic children, see Krasnogorsky: *Amer. Journ. Child. Dis.*, December, 1925.

those Poor Law services which are similar to, or even identical with, those which these authorities already provide and administer—maternity and child welfare work, education work, and the like. The number of separate authorities might be slightly diminished, but the overlapping and duplication of the work of the large number that would remain would probably be even more pronounced than before. On one point to which the Association attaches considerable importance—co-option—the new proposals would make the position even more unsatisfactory than it was under the old. There would be no power of co-option on to the health committees, but only on to the boards of guardians and on to the committees of management of institutions, and persons co-opted would not be such as are experienced in health services or administration, but, much more narrowly, those who had had such experience in Poor Law work merely. Moreover, in rural areas, that preponderance of power in the hands of the rural district councillors which in many areas has made Poor Law administration a dead letter or a scandal, would be confirmed and strengthened without any provision for appeal, substitution, or redress.

It is fair to state that some mitigation of the criticism on one of the above points may be found in the provision that the council of a county or county borough may make proposals for the partial use of a transferred institution "for other purposes in relation to its general health organization." Such a provision would in some cases enable some institutional accommodation to be used instead of remaining idle; but from the point of view of administration, in view of the other proposed arrangements for management and finance, this would complicate matters still further. It is to be presumed that the new scheme will be seriously discussed between Mr. Chamberlain and the representatives of local authorities. It might still be found possible in the case of county boroughs to preserve some of the best features of the old proposals in conjunction with the new; but it is difficult to see how, in other respects, the new scheme can be reconciled with the policy of the Association. Indeed, the danger is that, if carried into effect, it may be an actual obstruction to the success of that policy by producing an illusory appearance of something important having been done, whereas in essential matters things would in fact be very much as they were. If the long-promised bill for Poor Law reform is at last to be introduced early next year it seems desirable that the Council of the Association and the special committee dealing with this subject should seriously consider the new situation and make representations to the Minister of Health at an early date.

The main heads of the scheme, as they appeared in the *Times* of June 2nd, are as follows:

(1) On a day to be appointed by the Act the councils of county boroughs to become the guardians for those boroughs, and subject to what is hereafter provided, the councils of non-county boroughs and other county districts to become the guardians for such boroughs and county districts.

(2) As soon as possible after the passing of the Act, the councils of counties and county boroughs to make a survey of Poor Law institutional accommodation in consultation with existing Poor Law authorities and their officers. Where a county or county borough includes any Poor Law area which extends into another county or county borough, the survey, as far as it affects such area, to be made in consultation between the councils concerned.

(3) As soon as possible after the passing of the Act councils of counties in consultation with the councils of non-county boroughs and county districts should take into consideration the areas of existing Poor Law unions and should readjust them on the following principles:

(*a*) that the area of each county borough is to be a single union;

(*b*) that the area of each union is to be inside a single county;

(*c*) that the area of each union must coincide with the area of one or more non-county boroughs or county districts;

(*d*) that where it can be shown to be advantageous, having regard to such factors as the extent of pauperism, population and rateable value, convenient administrative centres and availability of offices, the number of unions in the county area may be reduced.

(4) The proposed new boundaries to be included in county council schemes to be submitted to the Minister, who would be empowered to approve, with or without modification, and himself to make a scheme in case of default. Provision to be made for proper publication of schemes and power to councils of non-county boroughs and county districts to make representations to the Minister in respect of any scheme.

(5) The board of guardians for each union thus constituted to be a body composed of the rural district councillors for each rural district comprised in the area, together with a proportion of the councillors of the non-county boroughs and urban districts comprised in it. Power in this case also for the non-county borough and county district councils to make representations to the Minister.

(6) On a day to be appointed by the Act all institutions (other than offices for general administration, offices of relieving officers and similar buildings) and liabilities in connexion therewith to be transferred to councils of counties and county boroughs respectively. If the area of the former Poor Law authority was wholly within a county borough or county the transfer to be to the council of the county borough or county concerned. Where the area of the former Poor Law authority was not wholly within one county or county borough the institutional property and liabilities to be transferred as may be agreed between the councils concerned, or in default of agreement the matter to be determined by order of the Minister. Any agreement or order to provide for transfer, with or without conditions, or for joint user, and so far as adjustment of institutional property and liabilities are concerned, to be subject to general rules.

As regards all other properties and liabilities:

(*a*) Where the area of the former Poor Law authority was comprised within a county borough or within the area of the Poor Law union constituted by the county council scheme properties and liabilities to be transferred to the council of the county borough or to the guardians of the new Poor Law union.

(*b*) Where the area of the former Poor Law authority was not comprised within the area of a county borough or of a new Poor Law union the transfer to be matter for agreement between the county boroughs or Poor Law unions concerned, subject to determination of the Minister in default of agreement and to provisions for adjustment where required.

Where a county or county borough or a new Poor Law area includes the whole or parts of two or more former Poor Law unions, equitable adjustments to be made in accordance with general rules contained in the Act, in respect of the institutional and other properties and liabilities of the several Poor Law authorities transferred to the council of the county or county borough or to the guardians of the Poor Law union constituted by the scheme, unless the authorities concerned (including the boards of guardians of the former unions) shall have agreed before the appointed day that an adjustment is unnecessary.

(7) As soon as possible after the passing of the Act, county boroughs to prepare and submit to the Minister for approval a scheme of administrative arrangements and use of institutions transferred to them as above, after consultation with county councils and councils of county boroughs as may be necessary having regard to present use made of Poor Law institutions.

(8) Counties and county boroughs to have power to make provision in their scheme for co-option where desirable on boards of guardians or on committees as the case may be of women members and of persons experienced in Poor Law work.

(9) County councils to prepare schemes for the use of institutions transferred to them after consultation with the new Poor Law guardians, and with the councils of such other counties and county boroughs as may be necessary.

(10) General power of authorities to form combinations amongst themselves.

(11) The expenses of the new guardians to be borne on the rates of the new unions.

(12) Subject to any arrangements of Parliament as to the allocation of the registration of births, deaths, and marriages, the new guardians to have the same powers and duties as the old, provided that they shall not be empowered to own or lease any institution or building (except their offices). The duty of providing accommodation for vagrants and for the purpose of work tests for the able-bodied to be placed on the county council or county borough.

(13) In cases where institutions are used by boards of guardians, the committee of management of each institution to be appointed as to not less than one-third by the new Poor Law Guardians in the area in which it is situated. The expense of running the transferred institutions and any new institutions required for Poor Law purposes shall, subject to provisions as to repayment, be a county or county borough charge, and the council of the county shall be under statutory obligation to make the required institutional provision for the needs of poor relief in their area and to take over cases on demand from the guardians. Except as regards institutions provided for vagrants and persons undergoing work-test, repayment shall be made to the county council by the guardians for each class of case on such terms, not exceeding the cost of maintenance, as may be agreed or determined by the Minister in default of agreement. (The cost involved in such repayment being a charge on the union area.) For the purpose of enabling them to carry out the obligations imposed upon them the county council shall have power to make arrangements with the councils of other counties, county boroughs, boroughs, or other county districts for the reception of cases of infectious diseases, maternity and child welfare and education coming under the Poor Law.

(14) Each county and county borough council to include in its scheme dealing with institutions proposals for the use of the transferred institutions for the above purposes and for other purposes in relation to its general health organization. Power for a county or county borough council to take cases from outside its area on agreed terms.

(15) Provision for transfer, superannuation, etc., of existing Poor Law officers in accordance with the established precedents.

THE PERMANENT USE OF THE TRACHEOTOMY TUBE.

SIR STCLAIR THOMSON'S ADDRESS.

SIR STCLAIR THOMSON delivered an address on the permanent use of the tracheotomy tube before the Interstate Post-Graduate Assembly of North America on June 3rd. He referred to the anxiety exhibited by many surgeons to dispense with the use of the cannula as soon as possible after tracheotomy had been performed and its more immediate objects attained; the main object of his address was to demonstrate that the practice was unreasonable and unwarrantable, and that the permanent use of the cannula was not only harmless but of great advantage to the patient in suitable cases.

The objections which had been raised to the permanent use of the cannula were various, the chief being that in the unnatural mode of respiration which it involved the inspired air was not warmed, moistened, and filtered as in the natural process, and consequently the lower air-passages were rendered liable to bronchial, pulmonary, and other troubles. Other objections were that speech was interfered with, and that the tube caused local discomfort and social disability. With regard to the normal mode of respiration, Sir StClair Thomson fully recognized its importance, and had himself shown, by researches on the defensive mechanisms of the nose, that under normal conditions inspired air in its passage through the nose becomes warmed, saturated with moisture, and sterilized before it reaches the lungs or even the larynx. Nasal respiration, however, was not always possible as a permanent mode of breathing. In children, in whom it was of particular importance, it was, fortunately, possible, by attention to adenoids, tonsillar affections, and other conditions, to retain or restore it before secondary effects on the developing body resulted from obstruction of the passages. In the adult, the absence of an adequate nasal airway was by no means as important as in children, although the onset of nasal stenosis and consequent mouth-breathing certainly reduced the protection afforded by the nasal cavities. Symptoms in the adult, attributed to nasal lesions, were, however, often due less to stenosis than to the accompanying sepsis. The permanent use of the tracheotomy tube in children, Sir StClair Thomson admitted, was liable to be followed by serious consequences. In them there was a greater tendency to respiratory catarrh, and the unused nasal and pharyngeal cavities failed to develop fully and the larynx to expand; education was handicapped by defective speech, and the inability to mix freely with playmates was a serious hindrance to general development. In the adult, on the other hand, many of these drawbacks were absent. Neither in the matter of growth nor education could any ill effects arise; defects in the voice would be referable, not to the cannula, but to laryngeal or other lesions; and local discomfort in the neck, due to pain, discharge, the necessity for changing dressings, and the frequent cleansing of the tube, was entirely absent in well planned tracheotomies. Social disability hardly existed, and the "canulard," as the wearer of a permanent cannula was called by the French, was in no way precluded from engaging in social functions, games, and physical exercises, with the exception of swimming. That a tracheotomy tube could be worn without inconvenience for prolonged periods was attested by cases such as that of a healthy old lady of 81, who had never suffered from bronchitis, although she had worn a cannula for seventy years, and a patient who died of senile decay at the age of 81, after wearing a tube for over fifty years.

It was probable that cases such as these would be more frequently met with if certain detailed precautions were observed in the performance of tracheotomies. In many cases the tube was introduced through the first ring of the trachea and the cricoid cartilage, through the cricoid and the crico-thyroid membrane, or even through the latter and part of the thyroid cartilage. As a consequence there was much catarrh and irritation of the larynx, the soft structures in the subglottic region became infected, perichondritis was a not unlikely complication and septic bronchitis a frequent sequel. Further, ill considered operative measures to dilate a stenosed larynx with a view to cure a "canulard" not infrequently resulted in death. In cases where, after a tracheotomy, it was proposed that the tube should be worn permanently, the operation ought to be performed as low as possible in the neck and always below the three first rings. In this situation, with the opening in the trachea immediately above the upper margin of the sternum, a cannula was easily concealed, did not interfere with the movements of the neck or larynx, caused no damage or irritation, and never set up perichondritis. In cases where a high tracheotomy had, as a matter of urgency, been performed and there was a probability that the tube would have to be worn indefinitely, there was no reason why a second tracheotomy should not be performed lower down in the neck and the higher opening be allowed to close.

In many instances the laryngeal condition calling for tracheotomy could be removed, or a resulting stenosis of the glottis cured; in such cases the tracheotomy tube could be abandoned with safety. This was possible in such conditions as impacted foreign bodies, acute laryngitis, oedema of the larynx, diphtheria, typhoid ulceration, syphilis, and tubercle. On the other hand, there were many cases in which a laryngeal stenosis was permanent, and it was to the principles of treatment to be recommended in such cases that Sir StClair Thomson particularly desired to call attention. In the first place an attempt to cure the stenosis itself was liable to fail and entail further damage or complete loss of voice; or, again, surgical intervention might merely scar the neck, stimulate to further stenosis, or encourage recurrence of arrested disease. Moreover, many of the methods employed for overcoming a laryngeal stenosis were tedious, painful, often unsatisfactory, and not free from danger. In the second place the permanent wearing of a cannula in a well executed opening just above the sternum was, in adults, by no means the disaster it was often represented to be; and it was not incompatible with a long, healthy, and useful life. In the third place the wearing of a tracheotomy tube would in many cases preserve a useful voice, while avoiding the alternative of a mutilating excision of the larynx.

Sir StClair Thomson exhibited some permanent "canulards," including cases of complete bilateral laryngeal paralysis, lupus, stenosis from surgical trauma, syphilis, tuberculosis, enchondroma, and carcinoma. The following are brief notes of some typical cases:

A woman, aged 20, with a goitre and marked stridor from complete bilateral abductor paralysis; has worn a tube for four years, without a day's illness or any respiratory trouble; voice good; tube easily concealed and causing no disability.

A man, aged 47; a year previously a carcinoma of the right cord was removed by thermo-cautery and a tube worn for six months; the larynx closed almost completely; laryngostomy and dilatation with rubber tubes during four months; glottis reduced to chink by cicatrization; low tracheotomy; patient greatly relieved, able to resume physical exercises, and voice improved; tube worn for seven years.

A woman, aged 34, with stridor and suffocative attacks from syphilitic stenosis; two years' treatment unavailing; low tracheotomy; in robust health twenty years later; able to take physical exercises; never subject to bronchitis.

A woman, aged 33, with urgent stenosis from lupus, which had been treated since the age of 5 years; low tracheotomy; tube now worn for eleven years; able to take physical exercises; voice strong and clear; experiences no social disability; tube readily concealed; never has bronchitis.

A woman, aged 42; dyspnoea on the slightest exertion, resulting from cicatricial contraction of the glottis following cure of a tuberculous deposit by means of the galvano-cautery; low tracheotomy; tube now worn for three years; in active work and able to walk several miles; voice good.

A woman, aged 32; tuberculous deposit cured by galvano-cautery, but followed by gradual stenosis necessitating tracheotomy after five years; low tracheotomy; in active work and can walk for miles; tube now worn for five years without inconvenience.

A man, aged 29; laryngeal stridor for eighteen months due to fungating tuberculous deposit obstructing glottis; low tracheotomy; ten months later he was free from stridor, the glottis was free and the fungating deposit had disappeared; could only speak in a whisper.

A woman, aged 41; carcinoma involving entire right vocal cords; removal by laryngo-fissure; recurrence; right half of thyroid and cricoid excised through lateral pharyngotomy, and skin-flaps folded in to make fresh lining to larynx; lumen of larynx insufficient; has worn low tracheotomy tube for seven years; voice strong;

is in active work and able to walk long distances; never has bronchitis.

A woman, aged 57; carcinoma of the right cord had been removed seven years previously; recurrence in left cord; removal by laryngo-fissure, and low tracheotomy tube worn since (four years); laryngeal airway adequate for respiration, but not for active life she leads; speaks in low whisper; has never had bronchitis.

The last two cases illustrated very forcibly the advantages of low tracheotomy and the permanent cannula; the alternative would have been total excision of the larynx.

THE NEW SCIENCE SCHOOL AT CLIFTON COLLEGE.

OPENING BY THE PRINCE OF WALES.

WHEN Clifton College was founded in 1862 it was intended that it should rank as one of the "public schools." None of the others included natural science in their curriculum; but Percival, the twenty-eight-year-old headmaster of the new school, determined with singular foresight and courage to give it an important place and to secure the best teachers. The first appointment, that of Mr. (afterwards Professor) Leipner, was made in September, 1862. Percival introduced in the next few years a series of distinguished scientific teachers: Debus, afterwards professor at the Royal Naval College, Greenwich, and no fewer than five men who became Fellows of the Royal Society—A. W. Reinold, John Perry, Sir William Tilden, A. M. Worthington, and W. A. Shenstone—together with M. J. Barrington Ward and G. H. Wollaston. It was in the school laboratory that Shenstone first melted silica, and some of the early tubes and thermometers which he made are still preserved.

In 1867 Dr. Percival was able to open the first school laboratories in the kingdom, so that at a time when most schools made no provision whatever for science, Clifton had ample and well equipped laboratories, directed by a staff of brilliant scientists. The school rapidly gained a reputation for sound scientific education, and exerted a profound influence on contemporary progress. Its example has played a weighty part in securing the inclusion of science in the curriculum of our public and secondary schools.

While Clifton's reputation in the teaching of natural science has been maintained, the accommodation has for many years been out of date and inadequate. The erection of new and extensive buildings was a necessity if the school intended to hold its traditional lead in science. The council at length resolved to build an entirely new science school, so conceived and equipped as to place Clifton once more ahead of friendly rivals.

The Speaker of the House of Commons, the Right Hon. J. H. Whitley, M.P., an old Cliftonian, undertook to raise the necessary sum of £50,000, and has already obtained more than four-fifths of that amount from old members of the school. The services of an acknowledged leader in this style of architecture, Mr. Alan E. Muntz, were fortunately available, and the council empowered him to meet all the wishes of the science staff as to general arrangement, accommodation, and equipment.

The outcome of this far-sighted policy has been that the new science school, opened on June 2nd by H.R.H. the Prince of Wales, represents a great advance upon any other school science buildings in the kingdom.

The present design was arrived at after the consideration and rejection of several others. The preservation of the close for games was regarded as essential, and this accounts for the somewhat recessed position of the buildings, which cover a considerable ground area and are in Gothic style. Few modern science buildings are Gothic in design, but in this instance it was felt that the architectural surroundings of the college left no possible alternative, and by the adoption of a late period in this style the difficulty of securing the ample natural light necessary has been met satisfactorily. Bath stone has been employed, with local stone for general walling, as used in other college buildings.

The design comprises two principal floors with a partial basement and partial second story. The extreme length of the building is some 160 feet, and the breadth about 64 feet. It consists of a central block, which contains the laboratories and their adjuncts, with two wings of two stories only, devoted to four lecture rooms. The ground floor is devoted to physics, and comprises two elementary laboratories on the frontage (40 feet by 32 feet) on either side of the central entrance, giving access to a corridor, at the ends of which are the two lecture rooms with preparation rooms attached, approached also by separate external doors to the corridor terminations. On the other side of the corridor are: on the right, an advanced laboratory (37 by 20 feet) with adjoining store; and, on the left of the central staircase and goods entrance, a repair workshop and a masters' room (17 feet and 19 feet by 20 feet respectively). A small research room and dark room are also provided on this floor.

The first floor, devoted to chemistry, is similarly arranged, but provides between the large elementary laboratories a balance room and dispensary, and over the workshop is a biological laboratory. By reducing the corridor height on this floor some cross lighting and ventilation has been made possible in these rooms. A second floor is provided over the frontage rooms in the pitched roof, and is devoted to the science library, 40 feet by 22 feet, which is fitted in oak, and a geography room of similar size. The remainder of the building at this level provides an asphalt flat available for experimental purposes, and at a height which regards the admission of sunlight to the open swimming bath behind them. A basement, below the rear central rooms only, contains an accelerated hot water heating plant, steam plant for laboratory purposes, unpacking room, switchboards and batteries, and a hand lift connecting this with other floors. Water is available at two pressures; electric power is supplied both from mains and for low voltage work from batteries, and an automatic exchange telephone system connecting all rooms has been installed.*

When the Prince of Wales arrived at Bristol he was met at the station by the Lord Mayor of Bristol, with whom he drove through the streets of the city, welcomed by the cheers of the crowds and by beflagged shops and houses. At the memorial gate of the college the Prince was received by the President of the college (Earl Haig), the chairman of the council (Sir Herbert Warren), and the headmaster (Mr. Norman Whatley). Within the gate, where the names of those who fell in the war are inscribed, the Prince laid laurel wreaths. The members of the college council and the two senior masters (Mr. E. J. Barff and Mr. C. H. St. L. Russell) were presented to His Royal Highness, who then lunched informally with the boys in School House. Afterwards he walked to the new science school, pausing at the South African war memorial to place a wreath.

Earl Haig and the Headmaster welcomed the Prince in short speeches, thanking him for the honour he was conferring on the school, and His Royal Highness replied in a happy and apt speech. It was, he said, a particularly appropriate task for him to perform, seeing that he at present occupied the presidential chair of the British Association. In this capacity he had made many new friends, and had found that the learned men of science, of whom he had perhaps been a little afraid, had introduced him to many fresh interests. He advised the boys to pay some attention to natural science, even though it might not be their professional study, for the older they grew the more science was going to matter, and even a slight knowledge of it would add to the interest of life.

The head of the school then presented to the Prince the key of the building, a copy of a French key of 1570, with which the Prince opened the doors of the new school, and, passing inside, inspected the interior. He then visited the armoury and the library, and informally opened the new squash rackets and fives courts in the New Field.

It was a day of hot sunshine with cool breezes.

* We are indebted to the school authorities for courteously supplying details of the new laboratories.

BIRTHDAY HONOURS.

THE honours list issued on the occasion of His Majesty's birthday included the names of the following members of the medical profession:

K.C.V.O.

EDWARD FARQUHAR BUZZARD, M.D., F.R.C.P., Physician Extraordinary to the King; Physician to St. Thomas's Hospital.

K.B.E. (Civil Division).

CHARLES PERCY BARLEE CLUBBE, M.R.C.S., L.R.C.P., F.A.C.S., Consulting Surgeon, Royal Prince Alfred Hospital, Sydney, in recognition of services to the Commonwealth of Australia.

Knighthood.

CHARLES JAMES MARTIN, C.M.G., D.Sc., LL.D., D.C.L., F.R.S., M.B., F.R.C.P., Director of the Lister Institute, London (formerly Chairman of the Science Committee of the British Medical Association).

LOUIS EDWARD BARNETT, C.M.G., M.B., C.M., F.R.C.S., Professor of Surgery, Otago University, Dominion of New Zealand; President of the Australasian Medical Congress held at Dunedin, 1927, under the auspices of the British Medical Association.

C.B. (Military Division).

Major-General JOHN MACFARLANE SLOAN, C.M.G., D.S.O., M.B., late R.A.M.C., Deputy Director of Medical Services, Southern Command, India.

C.B. (Civil Division).

Colonel CHARLES PYE OLIVER, C.M.G., T.D., M.D., late Territorial Army.

C.V.O.

HENRY LINNINGTON MARTYN, M.V.O., M.B., F.R.C.S., Surgeon Apothecary to H.M. Household at Windsor.

C.I.E.

Lieut.-Colonel JOHN CYRIL HOLDICH LEICESTER, I.M.S., lately Officiating Surgeon-General to the Government of Bengal.

Major ALFRED GEDDES TRESIDDER, I.M.S., Surgeon to His Excellency the Governor of Bombay.

C.B.E. (Military Division).

Surgeon Captain ALFRED JAMES HEWITT, R.N.

C.B.E. (Civil Division).

NEIL MORRISON MACFARLANE, M.D., C.M., Principal Medical Officer, Basutoland.

WILLIAM MARSHALL PHILIP, M.B., C.M., lately Medical Officer of Health, Colombo Municipal Council, Ceylon.

O.B.E. (Military Division).

Surgeon Commander GUY LESLIE BUCKERIDGE, R.N.

Major CHARLES MORGAN FINNY, M.B., F.R.C.S., R.A.M.C.

Major JOHN HEATLEY SPENCER, M.D., R.A.M.C.

Captain HAROLD WILLIAMSON, M.B., F.R.C.S., I.M.S.

O.B.E. (Civil Division).

Dr. EDMUND LLOYD, M.B.E., Church Missionary Society.

Captain MAHOMED FAZAL-UD-DIN, I.M.S., Agency Surgeon at Jandola, South Waziristan.

ATTILIO CRITIEN, M.B.E., M.D., Chief Government Medical Officer and Superintendent of Public Health, Malta.

Mrs. CHARLOTTE ELIZABETH FERGUSON DAVIE, M.D., in recognition of her services in the Straits Settlements.

JOHN RANDALL PHILLIPS, M.B., Senior Member of the Legislative Council of Barbados.

Major HASAN SUHRAWARDY, Indian Territorial Medical Corps, medical practitioner, Bengal.

M.B.E. (Military Division).

Subassistant Surgeon Subadar GURDITT SINGH, I.M.D.

Quartermaster and Lieutenant JOSEPH EDWARD PUGH, R.A.M.C.

Jemadar SAYED GUL AKBER SHAH, Subassistant Surgeon, 2nd Cavalry Regiment, Iraq Levies.

Assistant Surgeon (2nd Class) HENRY CARLYLE WILLIAM WINDSOR, I.M.D.

M.B.E. (Civil Division).

KOBAD DHUNJIBHAI MUGASETH, Medical Practitioner, Calicut, Madras.

Kaisar-i-Hind Medal (First Class) (for Public Services in India).

Miss ETHEL ADELAIDE DOUGLAS, M.B., B.S., Medical Officer in Charge of the Kinnaird Women's Hospital, Lucknow.

Dr. CARL FREDRIK KUGELBERG, Church of Sweden Mission, Tirupattur, Ramnad District, Madras.

The Rev. CALEB DAVIES, Medical Superintendent, Sonthal Mission Hospital, Sarenga, Bankura, Bengal.

Union of South Africa.

[FROM OUR CORRESPONDENT IN PRETORIA.]

ENZOÖTIC RABIES.

ALTHOUGH several outbreaks of rabies, more or less serious, were described as having occurred in South Africa last century, the disease has been almost entirely unknown in the Union during the past thirty years. There has been nothing comparable to the post-war prevalence which occurred on the continent of Europe. Of late years, however, disquieting evidence has emerged of the existence of rabies among two species of wild animals of the Union—the yellow mongoose and the genet cat. Both are small carnivores, the former belonging to the Viverridae and the latter to the Felinae. Both are shy animals, normally never approaching homesteads. But according to reliable native evidence they periodically go mad, and will then approach human habitations and actually attack persons. These natives maintain that a person or animal so bitten will often within a period of a month or two die after having shown signs of madness.

Since 1916 six cases have been described by country practitioners with symptoms indistinguishable from those of rabies, where the biting animal was shown to have been a mongoose. These cases have invariably been fatal after an illness never lasting longer than six days; in all it was found on subsequent inquiry that the patient had been bitten a month or six weeks previously by a mongoose. Unfortunately in none was pathological confirmation possible, as *post-mortem* material, when forwarded, invariably arrived at the laboratory in a decomposed state, so that neither recognition of Negri bodies nor inoculation tests were possible.

In December, 1920, a European male child on a farm in the northern Free State died two days after symptoms of rabies had appeared; six weeks previously he had been bitten in the shoulder while interfering in a fight between his domestic cat and a mongoose. The cat survived until after the death of the child, when it was killed and the head sent to the South African Institute for Medical Research in Johannesburg. The result of the examination was negative. Three years later a case was reported from a farm in the Middelburg district of the Transvaal. Eight weeks previous to the onset of symptoms the patient, an agricultural student, aged 21 years, had given chase to a yellow mongoose which he had come across wandering aimlessly on the veld. Ordinarily this creature is very active, and quite impossible to catch by chasing; yet this specimen was caught after being followed by its captor through four well strung barbed wire fences. It was, therefore, certainly not in normal health. When caught it bit the man savagely in the finger, and held on so pertinaciously that a knife had to be used as a lever to open the jaws. The case was described by the attending practitioner in the *South African Medical Record*, and the careful account left little doubt that the case was one of rabies. The relatives would not consent to a *post-mortem* examination, and the practitioner was unaware that such an examination could be ordered by the magistrate under Section 34 of the South African Public Health Act. The Department of Public Health was notified too late for confirmation by *post-mortem* and laboratory examination to be possible.

Last June a case was reported from a farm in the Wolmaransstad district of the Transvaal. A European boy, aged 7, was bitten by a yellow mongoose in the right hand, between the thumb and the first finger. He had found the animal lying ill in a prospector's hole. On lifting it, it took such a firm hold of the boy's hand with its teeth that his companions had to hit the animal with stones to induce it to let go. The wound healed cleanly, but some six weeks later the boy became drowsy and the site of the bite painful. Typical symptoms developed; spasm of the throat muscles of increasing violence occurred on attempting to drink; by the morning of the third day the lad was quite unable to swallow anything; the mere mention of fluid would bring on a violent spasm. Death occurred on the

evening of the third day, and the body was buried without examination.

In these and similar cases amongst natives, the infecting animal appears almost certainly to have been the yellow mongoose, locally known to the Boer farmers as the "witpuntstert meerkat" (*Cynictis penicillata*). We were becoming used to these cases when, last September, another animal became incriminated. A female European child in the Vryburg district of northern Cape Province became ill and died four and a half weeks after being bitten by a spotted genet cat. The symptoms described by the attending physician were again those of rabies. Thirty-two days prior to the onset of symptoms the parents had been visiting with the child at a neighbouring farm. All three slept outside on the stoep, the child being in a cot alongside the mother. The father was lying in bed smoking when he became aware of a noise in the cot. The mother woke, and, feeling instinctively with her hand for the child, encountered something furry, which she took to be the domestic cat. Trying to push this away she was bitten in the finger. Her husband then jumped up, and found that a wild cat had its teeth embedded in the child's throat. Removing the animal with difficulty, he was bitten in both hands. The cat was killed and thrown into the bush. After the child's condition (three and a half weeks later) had been diagnosed the parents were given a full course of treatment with carbolized antirabic vaccine, and neither developed symptoms. A *post-mortem* examination of the child was not performed.

Immediately this case was reported to the Department of Public Health an inquiry was instituted, and although no material suitable for laboratory examination was obtained some remarkable information was gleaned. In this and the neighbouring district of Mafeking there was found to be a general belief amongst both natives and European farmers that a fatal madness follows bites by mad wild cats. Only when mad will the genet attack man or large domestic animals, and then a fatal result is to be expected. An ox belonging to a progressive English farmer went mad and died some weeks after being bitten by a wild cat. Several natives and dogs were said to have died after similar experiences. There is little doubt that in the Mafeking and Vryburg districts rabies is endemic among the genets. They are handsome animals, and it is unfortunate that their extermination will become almost a necessity.

In addition to the cases directly attributed to mongoose or genet bites, several cases have been described since 1924 where the biting animal has been the domestic dog. But all these have occurred in regions where the yellow mongoose is plentiful, and the probabilities are that these dogs became infective through attacking or being attacked by diseased mongoose. Three cases of this nature have been reported since the beginning of the present year.

Hookworm in the Witwatersrand Mines.

Many causes have been assigned for the existence of the class of "poor whites" in South Africa. The occurrence of a certain number of poor whites in an essentially black man's country appears to be inevitable where it is insisted that the lowest white standard of living shall be considerably above that of the black standard. This standard of living assumes on the part of all whites capacities for earning superior to those of natives; and some whites will always fall short of such earning capacities. But in the Union the number of poor whites is relatively excessive; climatic and other causes to explain this are continually being sought. Without doubt in the malarious regions of the Union malaria is accountable for much lowering of earning capacity. At various times it has been suggested, without any apparent evidence, that in the semi-tropical parts of the Union hookworm disease might be an important contributory cause of the chronic lack of vitality and general ill health which characterizes the agrarian white population of these parts. There is still no proof and indeed little evidence in favour of this.

Though it is unlikely in the extreme that hookworm is parasitic in the intestines of Europeans of the Union unconnected with the mines other than as an exceptional occurrence, it has recently been shown that the parasites are quite common in natives working on one of the Rand mines; and even some European miners have been found to be infected. Last year a zoologist (Dr. Sanground) interested himself in the intestinal parasites of native mine workers. He examined the faeces of forty-six native patients in the City Deep Hospital and found that twenty-two of them were infected with hookworm. Dr. Orenstein, superintendent of sanitation of the Rand Mines, Ltd., decided as the result of this discovery that a systematic investigation of the subject was necessary. This is now being conducted by Professor W. O. Fischer, who has already made extensive examinations of the faeces of natives admitted to the City Deep Central Native Hospital. Similar examinations are to made at other mines. A preliminary report has been published by Professor Fischer and Dr. Orenstein; from the observations made at City Deep it is evident that a considerable number of the natives recruited from the East Coast (Portuguese East Africa) are infected with the parasite, and that infection occurs also in British South African natives. That the prevalence of hookworm amongst mine natives came almost as a sudden discovery is not very surprising when one remembers the well established fact that African races, though heavily infected, often show no obvious clinical manifestations of the disease.

After this investigation amongst natives had commenced the Miners' Phthisis Medical Bureau discovered the parasite in a group of ten European miners who had presented themselves at the bureau for medical examination. This appears to be the only group of European miners on the Witwatersrand known to have clinical symptoms demonstrably due to hookworm infection. The discovery of this European group led to an investigation of possible soil infection on the mines. In the four mines that have already been investigated hookworm larvae have been found in all in the soil forming the floor of latrines or their immediate neighbourhood and near drinking water containers. On these mines the only practical prophylactic methods are those which aim at guarding the mine soil from pollution, and the mass treatment of infected natives. A large proportion of the native miners do not habitually wear boots. Then the boots worn by native and most European miners are permeable to the water and mud both because of disrepair and because the lace-up type is used which permits of the entry of water through the lace holes.

Native Medical Practice in the Union.

There are in practice in the Union of South Africa six African Bantu natives. All of them are fully qualified, and, being on the *Register*, have the full rights and privileges of medical practitioners. Some of them appear, on their own evidence, not only to have large practices among Europeans, but to have actually more European than native patients. In view of the pressing need for medical services in the native territories this tendency of native graduates to adhere to the towns and practise chiefly among Europeans has caused adverse comment. It would appear to be most uncertain that State money spent in assisting native students to qualify in medicine would tend to alleviate native suffering in the territories. Even if such graduates were under contract to serve in the kraals, experience in West Africa has shown that such contracts are almost impossible to enforce. But opposition to the practice of native practitioners among Europeans has arisen. Since 1921 Dr. M. I. Molema has been practising in Mafeking, and has operated on European and native patients at the Victoria Hospital. From the beginning the nursing staff (all of whom are European) have shown resentment at having to take orders from an African when dealing with a white patient. Some six months ago they made a strong protest against Dr. Molema's operating on white patients while they had to assist at the operations and subsequently nurse the cases. As a result of that protest he ceased sending in European patients, but recently he again began sending such cases into hospital. When the third case, a girl of 19 years, arrived, the matron and nurses resigned in a body. That was on March 25th. The Mafeking Hospital Board in telegraphing the decision of the staff to the Administrator of the Cape Province stated that they were in sympathy

with the nurses. Though the staff has resigned, it is still carrying on the essential nursing services. After its resignation the hospital board again telegraphed to the Administrator a request that a section should be added to the hospital ordinance giving hospital boards the right to draw up a list of medical practitioners who were permitted to treat private patients in the hospital; urgent cases from other districts, however, always to be admitted.

Dr. Molema is the son of a chief of the Baralong tribe and came originally from Mafeking. He graduated M.B., Ch.B. at Glasgow University in 1919; he served during the war at Stobhill Military Hospital, Dublin, and subsequently at the Dublin Skin and Cancer Hospital. At Dublin he acquired a diploma in midwifery; he spent in all seven years overseas, returning to his native town of Mafeking in 1921. What the outcome of this local trouble will be is not yet clear, but it is significant of the growing opposition of the European community to the treatment of white patients, more particularly females, by native practitioners. Great publicity is being given to the trouble at Mafeking in the daily papers.

Scotland.

TREATMENT OF CANCER.

AT the annual meeting of the Royal Hospital for Home Relief to Incurables, Sir David Wallace, K.B.E., consulting surgeon to the Royal Infirmary, said that the society, which already dealt with late cases of cancer, which were incurable, might do something to assist in letting people know of the great importance attaching to early recognition of the disease. The report stated that the society began its work of relieving necessitous or deserving persons suffering from incurable disease 122 years ago. Nearly 500 sick persons in all parts of Scotland were at the present time receiving aid from the society, and the amount paid to annuitants during the year had been £4,897. The rate paid to incurable cancer patients under the Dunlop Fund managed by the society was £16 a year, and the total amount paid to annuitants suffering from this disease was £1,584.

THE HOSPITAL AND THE HOME.

At a meeting of the Edinburgh Women Citizens' Association on May 18th Miss Nora Milnes, director of the Edinburgh School of Social Study and Training, gave an address dealing with hospital social service. She pointed out that although the country was provided with hospitals of unrivalled efficiency, a serious defect existed in the large number of men and women who had to be kept waiting for admission because of insufficiency of the beds. This problem could be dealt with in one of two ways. The more obvious method was to provide more hospitals and more beds, which, however, would entail a large capital outlay. A better and cheaper method was to see that when patients left the hospital their own home conditions were changed, so that an early return of the ailment should be improbable. A great deal of time and money at the present time was wasted because the patients left the hospital to return to homes in which convalescence was impossible, or to take up work unsuitable for their particular constitution. This could to a large extent be avoided by co-operation between the social and the medical expert. Doctors and nurses had not time to undertake this work, and a third person was required who possessed a special knowledge of social conditions and an understanding of the home environment of the patients. The scheme for trained social workers originated in London, when the first lady almoner was appointed to the Royal Free Hospital in 1895. In 1905, largely through the effort of Dr. Cabot, work had been started in America, and in Great Britain the idea had spread rapidly. Scottish hospitals in this respect were behind the times. The Maternity Hospital and Sick Children's Hospital in Glasgow had had lady almoners for some time, and within the last two years the Royal Infirmary of Edinburgh had appointed a lady almoner with two junior assistants. These provisions were, however, inadequate. The social worker must work under the doctor, and should, therefore, be appointed by the hospital, her duty being social diagnosis. Only through the co-operation of the two attempts could a cure be made real, and such united effort would enable the funds of hospitals to be spent to the best purpose.

CENTRAL SCOTTISH INFIRMARIES.

At a meeting of Falkirk Dean of Guild Court on May 26th the plans were passed for the new Falkirk Infirmary, which is to be built on ground acquired at Gartcows, at an estimated cost of £100,000. The trustees of the infirmary are at present proceeding with the erection of five ward units and an administrative block, together with connecting main corridors. The buildings are to be constructed mainly of brick and concrete with freestone facing. The directors of Stirling Royal Infirmary are making an appeal for funds in aid of the new infirmary. The total amount required is estimated at £100,000, of which £75,341 has been already collected, including a sum of £9,500 paid by the education authority for the old infirmary. A further sum of £10,500 is to be received in grants for the maternity home. The new buildings are well advanced and it is expected that they will be ready for occupation by the summer of 1928. The directors of the Northern Infirmary, Inverness, have resolved to commence the reconstruction of the institution, at a cost of £100,000, of which £60,000 has been raised, the bulk of the money having been contributed by residents in various burghs and parishes in the North of Scotland. It has been decided to proceed at once with the erection of a children's ward, two central wards, and operating theatres, with connecting corridors and kitchen accommodation. Mr. A. J. C. Hamilton, M.B., F.R.C.S., has been appointed surgeon to the infirmary, in place of the late Mr. James Luke. Mr. Hamilton, who on graduation at Edinburgh University was awarded the Cunningham memorial medal and prize in anatomy and the Annandale gold medal in clinical surgery, at present holds appointments as clinical surgical tutor in the Edinburgh Royal Infirmary and senior clinical surgical assistant in the Royal Hospital for Sick Children, Edinburgh.

EDINBURGH ROYAL INFIRMARY PAGEANT.

The annual public effort by Edinburgh citizens to collect funds on behalf of the Royal Infirmary took place on May 28th. The event was favoured by fine weather, and from early morning collectors were busy in the streets and in a door-to-door canvass of the suburbs. A special feature was the effort made by students of the university, dressed in all kinds of bizarre costumes. They offered a ticket conferring the degree of "Bachelor of Philanthropy," for the price of 5s., and this diploma guaranteed the recipient against any further appeals by collectors during the day. In the afternoon a great pageant of decorated cars and horse-drawn vehicles, staging various tableaux, paraded through the streets and collected money from the assembled crowd. Altogether the amount received was £4,200, an increase of £1,200 on the figure for last year, when owing to the industrial crisis the amount was unusually low; several auxiliary celebrations have been held in country districts, and when these have all come to hand it is expected that the total amount to be received by the Royal Infirmary will not fall far short of £7,000.

NEW GLASGOW DENTAL HOSPITAL.

At the annual meeting of the Incorporated Glasgow Dental Hospital, held on May 16th, the adoption of the report was moved by the Lord Provost, who presided. It was intimated that the governors had secured a site for a new hospital at 201, Renfrew Street, and that plans had been prepared which would give to Glasgow and the West of Scotland the finest dental hospital in the kingdom. An appeal to the public would shortly be launched for funds to provide the necessary £90,000. During the past year there had been 53,966 attendances of persons who were unable to pay dental fees.

Ireland.

MEDICAL CERTIFICATES IN SCHOOL ATTENDANCE CASE.

AT Millstreet District Court, in a case under the School Attendance Act, a letter was read from Dr. Elizabeth Murphy, Ballymackeera, Macroom, stating that she had attended the children concerned. Their father had applied to her for a medical certificate, which she refused for the following reasons:

1. She is not obliged to issue such certificates under the Medical Charities Act.
2. The medical officers of Macroom Union resolved not to issue such certificates, as no provision has been made for medical certification under the School Attendance Act.
3. In other countries special officers, including medical officers, are paid and appointed to carry out the provisions of the Act at the expense of the State.

The position taken up by Dr. Murphy in this case is in accordance with the law. Poor Law medical officers as such are under no statutory obligation to supply gratuitously medical certificates for the purposes of the School Attendance Act. Although medical certificates are admissible and desirable, the district justices are empowered, on other evidence being produced, either to impose a fine or dismiss without their production.

CHILDREN'S SUNSHINE HOME.

In the course of the annual report of the committee of the Children's Sunshine Home, Stillorgan, it is stated that very great encouragement was given by the visit of inspection by Sir Robert Jones, arranged by Sir William Wheeler, last November. Sir Robert expressed himself very much pleased with the treatment of the children, the arrangements of the home, and the nature and methods of the curative work carried out in it. Like the committee, he hoped for its eventual extension, and in the meanwhile regarded it as the start of a new movement, and a centre for the education of the public mind in curative endeavour of this nature. He expressed himself convinced that modern treatment could only be carried out in hospitals outside the city. An additional room for the artificial sunlight lamp was provided by Mr. and Mrs. Charles Jacob. The lamp, with its engine and dynamo, has been installed and is now in constant use. But with this addition to the curative means at disposal, it has been necessary to add another trained nurse to the staff, as well as a whole-time man to attend to the engine, furnaces, etc. Subscriptions to meet the increased current expenses, and donations towards the cost of the new buildings are urgently needed.

England and Wales.

MEETING OF THE MEDICAL WOMEN'S FEDERATION IN MANCHESTER.

THE half-yearly meeting of the council of the Medical Women's Federation was held at Manchester on May 12th to 14th, the President, Dr. Christine Murrell, in the chair. The President, Dr. Murrell, and the Vice-Presidents, Dr. Clara Stewart and Dr. Ellen B. Orr, were re-elected for a second year of office. The question of the right of the local associations of medical women, constituting the Federation, to issue publications of any sort independently of the Federation, was raised, and after considerable discussion it was decided that no local association could publish anything in the name of the Federation until the consent of the council had been given. Reports were received from the various committees of the Federation and from representatives of the Federation on committees of the British Medical Association and other outside bodies. The Venereal Diseases Standing Committee had prepared a pamphlet dealing with the duty of the State in the control of venereal diseases. This was referred to the local associations for their consideration before publication. Appreciation was expressed of the report of the League of Nations on the traffic in women and children, and a resolution was passed stating that the council of the Medical Women's Federation hoped that the Committee of the League of Nations would continue its investigations from the health point of view, since they were convinced that such investigation would demonstrate the medical futility of the whole regulation system. This council also recorded its unshaken belief that the non-compulsory system in force in Great Britain and Holland had produced, and promised to produce, the best results. A protest was made against any attempt to graft on any form of compulsion or to reintroduce the hurtful association of the control of venereal disease with the police. The Standing Committee for the Defence of Married Medical Women reported that a meeting had been held to consider what steps might be taken to support the proposed Married Women's (Employment) Bill. The proposal to get up a petition to Parliament was considered, but in view of the shortness of time it was considered that individual letters to members of Parliament from constituents would be more useful. This was advised, and many such letters were written. The Menopause Subcommittee had drawn up two questions in order to conduct an investigation on a wide scale into the phenomena of the menopause. These were being widely circulated and valuable results were expected. The question of underpaid posts was dealt with in the report of the Standing Committee on Public Health. To aid in dissuading women from accepting "blacklisted" posts a pamphlet, which had been drawn up by the Standing Committee, was considered and passed by the council. This will be distributed to newly qualified medical women and D.P.H. students, and be sent also to deans and secretaries of medical schools and others. Cases of underpaid posts applied for or accepted by medical women during the last six months were reported. In all cases where the names could be obtained the candidates were approached; several of these had shown great public spirit and had retired in consequence. While regretting that some women had accepted these posts, the council was pleased to note that no member of the Federation was among them. A new Standing Committee on Psychological Medicine was formed, after consultation with the representative of a group of medical women specially engaged in this branch of medicine, and discussion on the present position of medical women in asylum posts. Reports were received of the work of the Benevolent Fund, of the Medical Women's Federation Loan Fund, and the John Rains Memorial Loan Fund administered by the Federation. It was shown that these funds had been very useful, and were much appreciated. It was reported that the sum subscribed to the Dame Louisa Aldrich-Blake Memorial Fund amounted to £267, and a cheque had accordingly been sent to Sir Alan Anderson, honorary treasurer of the fund.

VICTORIA HOSPITAL FOR CHILDREN, CHELSEA.

The Victoria Hospital for Children, Tite Street, Chelsea, was founded in 1866, and, in connexion with its diamond jubilee, a special appeal for further support was launched; a deficit of £8,561 was reduced to £2,936. In the sixtieth annual report mention is made of the establishment of a special ward which renders it possible to retain under skilled supervision for twenty-four hours children who have had operations for the removal of tonsils and adenoids. The continued growth of the work of the artificial light and massage departments has necessitated expansion, and a new building has recently been constructed. The provision of private wards for children of parents who can afford to pay a special charge for this accommodation has proved very popular. Negotiations have been in progress with the London County Council for the treatment of school children for tonsils and adenoids, and for tuberculosis, other than the pulmonary form; the question of providing for their artificial light and convalescent treatment is also under consideration. During the year under review 1,677 children were admitted to the hospital, an increase of 337 on 1925; there was a reduction of over £3 3s. in the average total cost of each in-patient. A slight drop occurred in the average number of patients resident at the convalescent home at Broadstairs. A local committee has been formed to assist the home, and in the first year of its existence over £300 was raised.

WOODFIELD NURSING HOME, OLDHAM.

A new nursing home for Oldham is being provided by the adaptation of Woodfield, a house situated in a well wooded estate, which at one time belonged to the late Lord Emmott. It has been presented by Dame Sarah Lees, who has taken an active interest in public life in Oldham since 1890, and was mayor of the borough in 1910-11. When the reconstruction of the building is complete there will be accommodation for seventeen patients. A large well lighted operating room is being equipped and one wing is allotted to the nursing staff. Electric light is supplied throughout the establishment and the sanitation has been entirely reconstructed. The home will be managed by a committee, which will include the governors of the Oldham Royal Infirmary and the Nursing Association, together with local medical practitioners. Although it is not intended to seek to make a profit, the terms have been fixed so as to ensure its being self-supporting.

Correspondence.

RHEUMATIC INFECTION IN CHILDREN.

SIR,—In his "Notes on juvenile rheumatism" (May 28th, p. 952) Dr. Reginald Miller gives further evidence of his "driving power," which Sir Humphry Rolleston recognized in the preface to the first report of the special subcommittee of the British Medical Association.

All of us who have studied the two reports of the British Medical Association and that of the Medical Research Council will find this comparison of these reports a further welcome stimulus.

In his present paper Dr. Miller deals with six chief points of contact between the first report of the British Medical Association and that of the Medical Research Council, and, in regard to two of these, notes that "agreement appears to be lacking." These issues are still *sub judice*. But on the remaining four points he notes "it may fairly be claimed that agreement is shown."

The reports dealt with emanate from important bodies; the contributors to them are widely recognized as medical authorities, and correspondence of results in the two separate and distinct reports must carry great weight. It is consequently important to be very accurate regarding facts.

1. *The Influence of Social Status.*

As a result of the agreement he finds between the two reports on this point Dr. Miller states: "It may therefore be held to be established that juvenile rheumatism is a disease of the poor, but not particularly of the poorest."

"Juvenile rheumatism" is a wide term. In the report of the Medical Research Council Dr. Still states that the term "rheumatism" accepted there is: "only cases which either at the time or in their past history showed such pronounced evidence of rheumatism as to leave no doubt of their character; the majority, therefore, were cases with heart disease or chorea; cases of joint disease were only accepted as 'rheumatic' when they were either associated with heart disease or chorea, or were of the acute character known as 'rheumatic fever.'" The figures he gives from King's College Hospital and from private practice also deal with gross rheumatic lesions.

The subcommittee of the British Medical Association dealt with "rheumatic heart disease in children." It states "that in London acute rheumatism is practically confined to the poorer classes. There is no dispute about this fact. Hutchison may be quoted as having recently confirmed this. . . ." Other references are also given, and figures regarding overcrowding and cleanliness.

It would appear, then, that by the term "juvenile rheumatism" we are to understand gross rheumatic signs, and in so far as it is advisable to "avoid the wholesale notification of thousands of cases" this appears a wise limitation. But to state as established that juvenile rheumatism in all its various clinical manifestations is a disease of the poor would, it appears to me, go beyond the ascertained facts both of the committees and of clinical work. Dr. Still and Dr. Hutchison see few severe or advanced cases of rheumatism in private work, because doubtless there are few of such cases to see. But both must see many private cases where a doubt or a fear as to rheumatic infection is present, where great therapeutic care appears indicated and is taken, where as a rule there is no untoward development, but where occasionally uncompromising rheumatic signs develop. I would put it to Dr. Miller that while it can hardly "be held to be established that juvenile rheumatism is a disease of the poor" it could be more accurately stated that juvenile rheumatism under satisfactory conditions can usually be controlled.

2 and 3. *The Influence of Heredity and of School Environment.*

Frankly, the figures in neither report appeal to me as proving anything regarding heredity—either for or against its importance. Any agreement on the matter is simply that there is no accurate knowledge. So far as the report from the British Medical Association is concerned, I can find nothing more precise and original in it than the sentences on page 7 quoted by Dr. Miller, and this reference is, after all, merely a pious opinion of Dr. Miller's. True, in the report of the Medical Research Council it is stated by Dr. Still that "no sufficient evidence of heredity was forthcoming," and this somewhat ambiguous conclusion was arrived at as a result of much painstaking work and many mathematical calculations. But when we examine the nature of the work on the results of which the calculations were based we read (p. 12):

"At the Children's Hospital, Great Ormond Street, all but 30 of the siblings of the rheumatic patients were actually examined by the medical officer. At the Royal Hospital for Sick Children, Glasgow, 118 were not examined owing to absence from home, etc. At St. Thomas's Hospital, owing to the fact that the medical examinations were carried out in hospital, 537 of the brothers and sisters of the rheumatic children and 117 of the siblings of the control cases were not actually examined."

On page 14 we read:

"At St. Thomas's Hospital, although the mothers were seen by Dr. Forest Smith and Dr. Hamilton, it was not found practicable to examine them all medically, but they were closely interrogated as to their rheumatic history. It was also not possible to examine the fathers; their histories were obtained from the mothers. In many cases information as to health in childhood (especially of the fathers) was scanty or unobtainable; in others, the grandmother or other relatives were consulted to verify dates, etc."

We can but admire and agree with the ambiguity of Dr. Still's final conclusion, but it is hard to discover how Dr. Miller can obtain satisfaction from the "agreement" of the two reports on this matter. Dr. Miller then passes from the hereditary aspect to consider home environment, and as we may pardonably conclude that the former influence is still indeterminate, pre-rheumatic constitutional and environmental conditions must be of vital importance.

Dr. Carey Coombs, speaking of the rheumatic diathesis, says (*Rheumatic Heart Disease*, p. 20):

"My own experience has not taught me to recognize any well defined type. The thin, eager, excitable child described by some writers as being prone to rheumatism is already rheumatic. . . ."

On the other hand, the late Dr. John Thomson wrote (*Clinical Study and Treatment of Sick Children*, p. 769):

"In our dealings with cases which present any of the phenomena of rheumatism, we have always to bear in mind that the illness depends largely on the presence of a peculiar constitution or diathesis, and that the treatment of this is even more important, and certainly much more difficult to have carried out, than the management of its temporary manifestations."

Dr. H. C. Cameron seeks a middle path, and while of opinion that (*Diseases of Children*, p. 94):

". . . a catarrhal tendency, inherited and inborn, is very frequently met with . . ." he (p. 95) "leaves open the question of how far the tendency is due to inherited weakness and how far it is the result of faults of diet and of hygiene," and says, "The truth appears to be that in the lymphatic and catarrhal child, with the characteristically low immunity against all infections, either tuberculosis or acute rheumatism may appear as a later development."

There is, I think, wide clinical evidence of a pre-rheumatic constitutional peculiarity or abnormality, and Rosenow's work on streptococci emphasizes the importance of the recognition of this. It is doubtful if it is specific, and it may be impossible to mark the line of actual rheumatic infection.

In a leading article of the BRITISH MEDICAL JOURNAL of May 14th on "The constitutional factor in disease" it is stated: "George Draper has been working on the same lines as Kraus for some six years at the Presbyterian Hospital, New York, and regards constitution as 'the aggregate of hereditary characters influenced more or less by environment, which determines the individual's reaction, successful or unsuccessful, to the stress of environment.'" The "home" as opposed to the "school" must be the all-important environment, particularly in the early years of life, because we know, through the apparent absence of the disease in babyhood, that constitutional development or physical growth and experience is necessary as a preliminary to rheumatic infection.

As, however, the children in the four Poor Law institutions of the Medical Research Council report were certainly "children of the poor," and yet escaped the disease, it appears incorrect to speak of a "rheumatic stratum of society," but, again, better to say that under satisfactory home conditions the development of juvenile rheumatism can usually be prevented.

4. *The Influence of Tonsillar Disease and Tonsillectomy.*

I am whole-heartedly with Dr. Miller in hoping that the two reports will conduce to more complete treatment of infected tonsils. I also, however, most sincerely hope that the criterion of health or otherwise of a tonsil accepted by the committee of the Medical Research Council may not be that to be depended upon. On page 31 of this report it is stated:

> "In two centres—namely, the Children's Hospital, Great Ormond Street, and the Royal Hospital for Sick Children, Glasgow, the variation in the size of the tonsils has been taken as the criterion of their unhealthiness or otherwise. They have been recorded, in most cases, as small, medium, large, and very large. The 'large' and 'very large' have been classified as unhealthy and the others as healthy in the absence of any remark to the contrary."

I would assure Dr. Miller that, while I may appear to be attempting to pick holes, this letter is determined rather by recognition of the valuable work he has done and is doing, and with the hope that it may be carried to full fruition.—I am, etc.,

Liverpool, May 28th. A. DINGWALL FORDYCE.

SIR,—The comparison of the reports on juvenile rheumatism by Dr. Reginald Miller (May 28th, p. 952) is of great interest, especially the part in which he emphasizes the novel evidence put forward in the report of the Medical Research Council with regard to the non-appearance of rheumatism in Poor Law institutions.

As a member for many years of the local board of guardians, I took an interest in the children in the cottage homes, and was the means of introducing a system whereby every case of sickness was properly investigated. During that time all sorts of diseases occurred among the inmates, but never a case of rheumatism, chorea, or their sequel, heart disease. In these homes there was nothing in the form of luxury, but the food was good, in fact of a standardized quality. The following is a list of articles of diet, with the minimum amount for one child a week.

Bread 7 lb.	Butter 8 oz.	Oatmeal 3 oz.
Bacon 2 oz.	Eggs 3	Sugar 8 oz.
Suet or lard 2½ oz.	Jam 1 oz.	Cocoa 2½ oz.
Peas 3 oz.	Cake 4 oz.	Flour 12 oz.
Tea ½ to ¾ oz.	Beef pork, or mutton, uncooked and free from bone 18 oz.	Vegetables 2 lb.
Milk (new, unskimmed and undiluted) 5 pints		Currants 2 oz.
Cheese 4 oz.	Potatoes 3 lb.	Rice 2 oz.

From this list it will be seen that each child gets at least 5 pints of milk (good milk), together with 4 ounces of cheese, 8 ounces of butter, and 3 eggs, with the result that each boy and girl is well supplied with lime-containing substances, and nothing in the form of vinegar, pickles, or sauces to reduce the quantity of lime in the body appears on the list.

These facts tend to emphasize my contention that every case of rheumatic fever or chorea arises from what I call the "acid or acid-taking" class, by which I mean that class of child who does not take milk, either through poverty or dislike, and aggravates this lack of lime-containing food by a partiality for acid or sour things.

The report of the Medical Research Council, by its statement that "want of maternal care" has much to do with the causation, seems to corroborate the conclusions at which I have arrived. If all investigators will agree that this subclass supplies all our cases of heart disease, we shall have achieved something substantial.—I am, etc.,

Swansea, May 31st. G. ARBOUR STEPHENS.

PROPHYLACTIC VACCINATION OF THE NEWLY BORN AGAINST TUBERCULOSIS.

SIR,—With reference to the second sentence of Professor Calmette's letter (May 28th, p. 987) I would point out that my criticism of what, as Professor Calmette explains, was the whole of Dr. Biraud's report to him was directed to the omission of details which, in my opinion, ought to have been published. I did not criticize Dr. Biraud's method of analysis; I think it was adequate and that no other statistician would get more out of the material than Dr. Biraud has already obtained.

The issues raised by Professor Calmette's work are, however, so important that I must ask your permission to expand my other criticism to which Professor Calmette does not refer. On page 210 of Professor Calmette's paper[1] there is an (italicized) assertion that, in France at least, 25 per cent. of children of tuberculous mothers or of children reared in contaminated surroundings die of tuberculosis in the first year of life. Let us examine the evidence upon which Professor Calmette relies. On page 206 he states that of 1,364 children reared under the stated conditions, 327 (24 per cent.) died in the first year "d'affections présumées tuberculeuses"; but we are not told what were the grounds of the presumption, what was the rate of mortality from *all* causes in the first year of life, and how the cases were chosen. On page 208, Strauss is cited as authority for the statement that of 6,820 children dealt with between 1906 and 1911 in Paris 3,429, or 50.28 per cent., died. We are not told whether this is the mortality of the first year or of the first five years of life, or what proportion of the deaths were due to tuberculosis. As the annual deaths of children aged 0 to 1 ascribed to tuberculosis in Paris numbered 213 in 1913, 188 in 1921, and 154 in 1922, 3,429 in five years would be more than six times the whole recorded mortality, so it is hardly credible that Strauss is referring to deaths from tuberculosis at 0 to 1. This evidence is, therefore, irrelevant.

On page 210 Weinberg is said to have found that in Stuttgart (1873-89) 30.52 per cent. of the children of tuberculous mothers died in the first year of life, but it is not mentioned that Weinberg (*Die Kinder der Tuberkulösen*, p. 58) also found that the death rate of the children of non-tuberculous mothers was 23.82 per cent., so that the excess mortality of the infants of the tuberculous was 6.70 per cent. These figures, which relate to mortality from all causes, have no direct relevance to Professor Calmette's contention, but Weinberg's very careful study does actually contain some relevant material which Professor Calmette has not quoted. The sixteenth chapter of Weinberg's book deals with the specific mortality of the children for the period 1873-1902, and I note these points. Considering only the children born within five years of the death of a tuberculous parent, 1,477 deaths occurred in the first year of life, and 84 of these deaths were certified to be due to tuberculosis. Assuming this to be an under-statement owing to imperfect certification, and making a liberal allowance for the understatement by multiplying by three, we reach 252, which is 17 per cent. of the total deaths.

Passing now from deaths to rates of mortality, I find that the rate of mortality from tuberculosis would be about 7 or 8 per cent., not 25 per cent. Now this estimate is in reasonable agreement with that of Kjer-Petersen and Ostenfeld, based upon a much smaller but more closely verified set of data. The maximum rate in their series (obtained by crediting the "doubtfuls" to tuberculosis) is 6.1 per cent., and the Upsala data of Bergman, quoted by

[1] *Annales de l'Institut Pasteur*, March, 1927.

them, give (when similarly treated) percentage mortalities ranging from 5.2 to 9.6. Dörner, who investigated tuberculosis in families in a district of Baden (see *Beiträge z. Klinik d. Tuberkulose*, xx, 1911, p. 20), gives the mortality from tuberculosis over the first *two* years of life as 17.1 per cent. when both parents died tuberculous, 8.7 per cent. when the mother only died of tuberculosis, 5.8 per cent. when the father only died of tuberculosis, and 1.9 per cent. when neither parent died of tuberculosis. All the evidence I have seen supports the view that both general and specific mortalities are higher amongst the children of the tuberculous than amongst the general population of children; none of it suggests that the excess specific mortality is of the order claimed by Professor Calmette. The importance of the point is obvious: if we have to do with a difference only of the order of a few per cent., we shall certainly need much larger compared samples in order to reach any satisfactory conclusion than would be the case if Professor Calmette's contention could be established. I suggest that the evidence he has tendered on this point is wholly insufficient to carry conviction.—I am, etc.,

MAJOR GREENWOOD.

Loughton, May 29th.

SYMPATHETIC INNERVATION OF STRIPED MUSCLE.

SIR,—In your editorial article of April 30th (p. 803) you very rightly bring again to the notice of surgeons the work of Royle and the late John Irvine Hunter in the treatment of spastic paralysis.

I should like to draw attention to the histological basis of the theory of the double innervation of striped muscle, as put forward by Hunter. He postulates the existence of two types of muscle fibre, one of which is solely innervated by sympathetic fibres, and the other solely by somatic fibres. This was based on Kulchitsky's work published in 1924 (*Journ. Anat.*, vol. lviii, 153). Boeke, who, on the other hand, commenced publishing work on this subject in 1909 (*Anat. Anz.*, 35, 193), holds that single muscle fibres are innervated by both sympathetic and somatic nerve fibres.

You quote Boeke as supporting the histological basis of Hunter's theory. In his most recent paper Boeke (1927, *Zeit. f. Mikr. Anat. Forsch.*, 8, 561) confirms his position with a wealth of diagrams, and states that it is certain that all striped muscle fibres receive a somatic innervation. This is quite contrary to Kulchitsky's observations, and to the theory as expressed by Hunter—that there is a type of striped muscle fibre which is innervated solely by the sympathetic fibres. In this paper Boeke concludes that, in opposition to the statement by Hunter and Latham, a spinal innervation to the thin protoplasmic rich muscle fibres was undoubtedly proved by degeneration methods.

While, therefore, the theory of a double function in striped muscle associated with its double innervation, somatic and sympathetic, may be gaining weight, the histology of the question is by no means so simple as would be inferred from your editorial article.

A further statement of the position and some evidence against the general acceptance of a type of innervation such as Kulchitsky found in snakes can be seen in my paper in *Brain* (1925, xlviii, 380).—I am, etc.,

H. S. D. GARVEN, M.D.

Moukden, Manchuria, May 19th.

UROGENITAL TUBERCULOSIS.

SIR,—There is one dogmatic statement in Mr. Nitch's otherwise instructive and interesting lecture (BRITISH MEDICAL JOURNAL, May 14th, p. 863) to which exception may be taken. He states that "in all cases tuberculin is of great value, but only after operation." I suggest, on the contrary, that tuberculin is sometimes so valuable before operation that all indications for operative treatment disappear; but on the other hand I doubt whether it is "in all cases of great value." It would be easy to quote from the literature and my own practice a considerable number of cases in support of these opinions, but one of my own cases may suffice at the moment.

Two years ago I showed a patient at a clinical meeting of the Manchester Medical Society for the purpose of illustrating the apparent value of tuberculin after operation had failed, and incidentally to suggest that it may sometimes render an operation superfluous. The history of this case is briefly as follows:

A man, aged 39, developed tuberculous epididymitis early in 1919. His left testicle was removed at the Manchester Royal Infirmary in June of that year. In May, 1920, he was referred to me for tuberculin treatment by Dr. H. F. Lee (Manchester), as the disease had developed in the right epididymis. He was febrile; there was a discharging sinus in the operation scar on the left side and the right epididymis was enlarged and tender; it subsequently broke down and discharged considerably from several sinuses for over a year. He became afebrile after six weeks' rest in bed. Tuberculin (BE) was then begun in very small doses (1/50,000 mg.) and cautiously increased. The maximum dose eventually reached about a year later was 1/1,500 mg. He returned to business after he had been under this treatment seven to eight months, as he had then regained weight and his general condition was very much improved. The subsequent history was that of steady improvement. He is now, at the end of seven years, in good health; all the sinuses are soundly healed. He still comes up occasionally for a prophylactic inoculation.

While a result of this kind is seen occasionally in genito-urinary cases, my experience is that glandular lesions give the most uniformly successful results. May I suggest in conclusion that, if it be agreed that appropriate tuberculin inoculations increase the resistance of some patients to the disease, there are valid theoretical grounds for adopting this treatment prior to operation in all afebrile cases, mainly in order to reduce the risk of disseminating the disease, which, I am inclined to think, sometimes happens as an immediate consequence of an operation. It is also well to have clearly in view the fact that an unpromising case may make, now and again, a surprisingly good response to tuberculin treatment, and that a contemplated operation may in such circumstances be avoided.—I am, etc.,

Manchester. J. STAVELY DICK.

AURICULAR FIBRILLATION.

SIR,—In view of the correspondence which has been taking place in the JOURNAL on the subject of auricular fibrillation, I will relate my personal experience.

My first attack of irregular cardiac action was while I was playing golf at Atherston in the early nineties; it quite spoiled my play for the time: occasional attacks came on at irregular intervals (five or six weeks) and often while sitting quietly or after meals. I remember one attack while on the Riffel Alp, which I attributed to the altitude. In the following year I had a bad attack while on a long cycle ride in Shropshire in a hilly and difficult country. From these attacks I quite recovered, and was able to go about my duties and make my usual exertions without trouble. By degrees, however, the attacks became more frequent and I sought advice from many well known and "special" medical men. "Quot homines, tot sententiae:" some said indigestion, others nervousness, others arterial tension, and I was ordered valerian tea instead of tea or coffee for breakfast, sodium bicarbonate before meals, and 1/20 grain of calomel three times a day.

In 1912 I retired and went to reside at Eastbourne. In 1914 a friend gave me Bergonié's treatment; the damp cold cloth at my back produced a chill and I developed cystitis, which laid me up for some weeks, with the added discomfort of bacillus coli. The attacks of fibrillation ceased and have never recurred, but a slight irregularity of the pulse exists, with a rate of about seventy.

Until eighteen months ago I cycled regularly, but owing to lameness in my left hip I have been obliged to abstain from that mode of progression. I consulted Sir James Mackenzie in 1912, and at first he did not recognize the disease, and not until he had had electro-cardiograms taken did he announce that my disorder was auricular fibrillation.—I am, etc.,

Eastbourne, May 23rd. MILNER MOORE, M.D.

DRUGS FOR SLEEPLESSNESS.

SIR,—May I add my experience of the use of medinal to that of Sir Maurice Craig?

During the past eight years I have given medinal to over two hundred patients in doses of from 5 to 8 grains nightly over periods ranging from a few weeks to several

months. The patients were all suffering from neuroses or mild psychoses. I have found it a most valuable drug; all patients have been under my close observation in a nursing home, and I have never seen any ill effects from its use, and although I keep in touch with patients after they leave my care, I have never heard of a case where its use was not readily discontinued. Under proper supervision medinal is a most valuable hypnotic, and it would be a great misfortune if its use should be discredited.—I am, etc.,

Chobham, Surrey, May 31st. CHARLES H. CALDICOTT.

POST-MORTEM EXAMINATIONS IN GENERAL PRACTICE.

SIR,—I would submit the following points for consideration:

1. In the majority of cases conditions found *post mortem* are not exactly those that were expected, even though the diagnosis is confirmed. Generally there is more, or there is less, than was thought to exist. Sometimes the doctor has a severe shock, sometimes he goes away from the *post-mortem* room completely mystified.
2. A laboratory in close proximity to the *post-mortem* room is essential. If this is not provided much valuable information may be lost, and in many instances the whole point of the case missed.
3. *Post-mortem* examinations are a supplement to clinical work. Granted he has average knowledge of pathology, the man who has attended in life will form a truer view of the whole case than an expert who sees the dead body for the first time.

For these reasons, if the extension of the public health service that has been mooted is ever brought about, I would recommend that laboratories as well as pathologists be provided and that the medical attendant be present and have joint responsibility for the report, lest half the value of these examinations be lost.—I am, etc.,

Southend-on-Sea, May 29th. R. A. S. SUNDERLAND.

Medico-Legal.

THE LUNACY LAW: LIMITATION OF ACTIONS.

HARNETT *v.* FISHER.

SINCE the decision of the House of Lords in the case of Harnett *v.* Bond and Adam received consideration in our columns, Mr. Harnett has obtained the verdict of a special jury that he was sane on the date when Dr. Holdrich Fisher gave a certificate on which a reception order was made out, and that Dr. Fisher did not act with reasonable care in certifying him. Owing, however, to the fact that Mr. Harnett did not issue his writ within the period allowed by the appropriate Statute of Limitations, judgement was entered for Dr. Fisher by the trial judge, and this judgement was upheld both in the Court of Appeal and in the House of Lords. The proceedings at each stage have been recorded in our columns, and the judgement of the House of Lords was reported at some length in our last issue (p. 1036). It was considered advisable to do so because no such report has been published elsewhere, but the decision of the House of Lords was on a point of law, and no principle of medical importance arose.

The only question on appeal was the purely legal one, whether Mr. Harnett's right of action was barred owing to the lapse of time before he issued his writ. Consequently the three reasoned judgements delivered by Lords Sumner, Atkinson, and Blanesburgh—the remaining two members simply concurring—contain references of a highly technical nature to various sections of Acts of Parliament, the effect of which cannot be fully appreciated by those who are not lawyers.

The majority of the House decided that the defendant doctor had properly pleaded the Statute of Limitations, 21 James I, c. 16, and that, as the writ was not issued within six years of the date on which Dr. Fisher made his examination and signed his certificate, the action was barred by that statute. The certificate was given on November 10th, 1912, and from that date until October 15th, 1921, Mr. Harnett was, in fact, an inmate of various asylums. It was accepted by the House of Lords that between those years Mr. Harnett was unable to bring his action, and a peculiar legal dilemma arose from which Lord Blanesburgh, in particular, attempted to find a way out. The ancient statute of James I said that in the case of a person *non compos mentis* time would not run until after such disability ceased, and so Mr. Harnett pleaded that from the date he was certified until October 15th, 1921, he ought in law to be treated as *non compos mentis*. Thus we have the spectacle of a plaintiff asking a jury for a verdict that he was in fact sane, and asking a judge for a ruling that he was in law insane during the same period of time for the purposes of the Statute of Limitations.

On a "liberal" construction, the plaintiff urged, the statute should be read so as to bring such a case as his within the disability section. The trial judge and all the judges on appeal, however, came to the conclusion that the statute could not be construed in that sense. Lord Sumner bluntly said that it could not be so interpreted without wresting it from its language in a way that could not be permitted.

It may seem strange that the Statute of Limitations was running against Mr. Harnett's right of action during a period when, in fact, he was in an asylum and was unable to issue his writ; but, on the other hand, the medical profession, upon whose members rests the responsibility of administering the Lunacy Acts, would be unfairly placed if the alternative construction were adopted, and an action for negligence were suspended over the head of the giver of a certificate during the whole of the period of the certified person's confinement, however long that period might be, and for six years afterwards. Both Lord Sumner and Lord Blanesburgh realized that this alternative construction was impossible, but whilst Lord Sumner held that the hardship occasioned by this dilemma must be borne by the party who, upon the ordinary construction of the words of the statute, should bear it, Lord Blanesburgh sought a solution in the Public Authorities Protection Act, 1893. His solution amounted to this. The Lunacy Act of 1890, like its predecessor of 1845, contained a provision that all actions must be commenced within twelve months of the release of the party bringing the action. Dr. Fisher had pleaded this section, only to discover before the trial that it had been repealed by the Public Authorities Protection Act, 1893. It was in these circumstances that Dr. Fisher amended and pleaded the statute of James.

Because Section 82 of the Lunacy Act, 1890—giving a person who considered he had been unjustly confined as a lunatic the right upon discharge to copies of the certificates on which a reception order was made—remains unrepealed, Lord Blanesburgh was led to the conclusion that the twelve months' limitation prevailing from 1845 until 1893 was not abolished, but lived in the shorter period of six months laid down in the repealing Act of 1893.

In other words, whilst Lord Sumner and the other members of the House held that the plaintiff's right of action was barred by the Statute of Limitations running against him continuously from November 10th, 1912, to November 10th, 1918, when he was still in the asylum, Lord Blanesburgh held that the plaintiff's right of action was barred by the Public Authorities Protection Act, 1893, running against him for six months from the date of his release. Lord Blanesburgh's conclusion did not help Mr. Harnett, the writ in the action having been issued more than six months after his escape, although, had the remaining members of the House agreed, it might have gone towards helping future plaintiffs in a similar position.

Lord Blanesburgh's argument presumes, however, that a medical practitioner, in giving a certificate for the purposes of a reception order, is doing an act to which the Public Authorities Protection Act, 1893,

applies; but here he is in disagreement with Lord Atkinson. As was said by Lord Buckmaster in another case, there are duties and authorities which are not public, to the exercise and discharge of which the Act of 1893 does not apply. In Lord Atkinson's view, the giver of a certificate for the reception of an alleged lunatic owes no duty to the general public or to any public institution or authority—he is simply engaged as a medical man to give an opinion as to a patient's state of health. Therefore, the limitation of six months provided by the Public Authorities Protection Act not applying, Lord Atkinson fell into line with Lord Sumner's view that the appropriate Statute of Limitations was that of James, despite the words of Lord Blanesburgh that the statute of James was singularly unsuited to this claim.

Therefore it will be seen that an anomalous situation in our lunacy laws was created by the repeal of the twelve months' limitation laid down in the Act of 1890. The circumstances of this case—in which one member of the House of Lords finds a substitute of six months in a later Act, and the remaining members, disagreeing, are driven back upon a statute of 1623 which prima facie may work injustice to a plaintiff—provide another consideration to which the Legislature should give attention when, in the fullness of time, it shall find opportunity to amend the law, in order that justice may be done alike to the general public and to their servants, the members of the medical profession.

Obituary.

HENRY COOK, M.D.,
Surgeon-General, I.M.S.(ret.).

SURGEON-GENERAL HENRY COOK, Bombay Medical Service (ret.), died on May 30th, at the age of 95. He was educated at the Grosvenor Place Medical School, at St. George's, and at St. Mary's Hospitals, and took the M.R.C.S. in 1854 and the M.D.St. Andrews and M.R.C.P. Lond. in 1858. He was elected F.R.C.P.Lond. in 1883. He entered the Indian Medical Service as assistant surgeon on January 24th, 1855, over seventy years ago, he attained the rank of deputy surgeon-general on June 23rd, 1884, and retired on November 21st, 1886, with an honorary step in rank. In his early years he served in Persia in 1857, and in the Abyssinian war of 1867-68, gaining the medal for each. His subsequent service was chiefly in civil employ in Bombay Presidency, where he held professorships in the Grant Medical College, Bombay, for many years, first that of hygiene, and afterwards the chair of medicine, in combination with the principalship of the college, until his promotion to the administrative grade.

During the last twenty-three years he had lived at Lee-on-Solent. He was a Fellow of the Royal Geographical, Meteorological, and Geological Societies, and a J.P. for Gloucestershire. During his career in Bombay he had been for some time chairman of the Bombay Municipal Corporation. He leaves a widow, two sons, and two daughters.

Since the death of Deputy Surgeon-General P. W. Sutherland, on June 6th, 1925, Surgeon-General Cook had been the senior officer on the retired list of the Indian Medical Service. The Indian Medical Service was closed to competition from 1860 to 1865, and there are now only two officers left alive, or at least shown as living, in the Army List, who entered that service previous to 1860: Surgeon-Majors A. Gamack (Madras, 1856) and G. Henderson (Bengal, 1859). As the Crown took over the Government of India from the East India Company in 1858, Dr. Gamack is the only Company's medical officer now living.

We regret to record the sudden death, on April 28th, of Dr. JAMES WEIR STEWART of Kelvinside, Glasgow. While proceeding to visit a patient he was suddenly taken ill and was assisted to the police station at Old Monkland. A doctor was summoned and a restorative given, but in half an hour he succumbed, death being due to angina pectoris. He was educated at George Watson's College, Edinburgh. He graduated M.B., C.M. in 1885, and afterwards studied diseases of the eye in London. He practised in the north-western district of Glasgow for nearly twenty years. In 1908 he accepted the post of medical officer to the Scottish Mineowners' Defence and Mutual Insurance Association. During the war he did valuable work for the British Red Cross Society. He was of a generous and kindly nature and of a buoyant disposition. He was not only much respected but greatly beloved by all with whom he came into contact, and will be greatly missed for his many unrecorded deeds of kindness. Dr. Stewart was unmarried, but leaves a sister who resided with him.

Dr. ALLAN WHITFIELD, who died on May 23rd at Babbacombe, was born in Shropshire in 1864, and received his medical education at Owens College, Manchester. He obtained the diplomas L.R.C.P., L.R.C.S.Edin., L.R.F.P.S.Glasg., and L.M. in 1895, and two years later the M.R.C.S.Eng. and L.R.C.P.Lond. For many years he carried on practice in Manchester, and during the war was a member of the recruiting board in that city. In 1921 he began to practise in Burton-on-Trent, but in the following year ill health compelled him to retire and live in the South of England. In 1924 he resumed active practice at Kingsteignton in Devon, but in 1926 he was again obliged to retire, and died after a long and painful illness. He was a member of the British Medical Association and of the Manchester Medical Guild. He is survived by his wife and one daughter.

Dr. EDWARD LOFTUS CAMBIE, who died on May 28th at his residence in Templemore, Tipperary, was born on December 25th, 1869, and received his medical education at the Royal College of Surgeons and the University of Dublin. He obtained the diplomas L.R.C.S.I., L.R.C.P.I., and L.M. in 1892. He carried on medical practice for twenty-one years at Portsmouth, and previous to this in London. Dr. Cambie was a man of considerable ability, and was held in the highest esteem by all who knew him. He was a member of the British Medical Association until his retirement from practice.

Medical Notes in Parliament.

[FROM OUR PARLIAMENTARY CORRESPONDENT.]

THE House of Commons will reassemble on June 13th and resume the Committee stage of the Trade Disputes and Trade Unions Bill. The Vaccination Bill has been put down for second reading on June 15th. Time is not likely to be available for its discussion, but Dr. Fremantle, Dr. Watts, Sir Richard Luce, Sir George Berry, and Dr. Vernon Davies have put down a motion for its rejection.

Mr. Baldwin announced, on June 1st, that the House of Commons would probably adjourn about the end of July, but that it would have to sit again during the autumn to complete the business of the present session.

On June 2nd, on the motion that the House adjourn over Whitsuntide, Sir A. Steel-Maitland replied to a debate on the Geneva Convention on hours of labour. He said that the object and policy of the Government in regard to this Convention was as recently stated by the Earl of Balfour in the House of Lords, but that the Government had to get over the difficulties first. He pointed out that the French Government had interpreted the Convention in a way which would be impossible in this country. For instance, it had, by regulations under the French Eight Hours Law, enacted that railwaymen might be required to be in attendance for twelve hours, counting as eight hours' work. To clear up the difficulties would take some time. In Great Britain such cases as those of the crucible-iron workers and the tailors who were on piecework without set hours at all had to be met.

Later in the same debate Mr. Lansbury called attention to the imprisonment of Mr. Bose, town clerk of Calcutta, under the Bengal Criminal Ordinance. Earl Winterton (Parliamentary Under Secretary for India) said, in reply, that Mr. Bose was imprisoned for breaking the law against revolutionary crime. Some time ago his health was found to be unsatisfactory, and a conditional offer of release was made, which he refused. Shortly afterwards, further investigation was made into the condition of his health, and it was found that he had not

improved. It was not true to say that he was dying, but his health was not improving, and consequently the Government released him unconditionally.

Shop Acts, 1920 and 1921.

When the Committee which is considering the Shop Acts of 1920 and 1921 met on May 31st Dr. Marion Phillips and Mrs. Adamson gave evidence on behalf of the Standing Joint Committee of Industrial Women's Organizations. They said inquiries showed that there was no real demand for later hours in confectioners' shops. Girls employed were often extremely young, and suffered physically from the long hours. Instances were given of sickness and general debility among them.

The General Medical Council.—Answering Mr. Macquisten, on June 2nd, Mr. Chamberlain said he did not think that modern developments in therapeutics necessitated any revision of the powers and duties of the General Medical Council. He added that the Earl of Balfour shared this view. Mr. Macquisten, in his question, had asked for the appointment of a Royal Commission to inquire into the operation of the Medical Acts and the powers and privileges of the General Medical Council.

Number of Insured Persons.—Mr. Chamberlain announced that at the end of 1926 there were, exclusive of persons over 70 who had ceased to pay contributions, 9,857,000 males insured in England and Wales under the National Health Insurance Act and 4,658,000 females. Since the end of 1925 the increases were 251,000 and 68,000 respectively. In Scotland the comparable figures at the end of 1926 were 1,144,000 males and 571,000 females, being an increase in the year of 28,000. In Northern Ireland the figures for 1926 are not expected to show material change from those for 1925, which were 194,300 males and 139,700 females.

Notes in Brief.

The latest official information from the Bombay Presidency indicates that conditions continue to improve in the four districts affected by cholera. In the week ended April 30th, 1,092 attacks by, and 461 deaths from, cholera were reported in these districts.

In a reply to Mr. Groves, Mr. Chamberlain said he would not introduce legislation requiring parents who believed in vaccination to make a statutory declaration of belief in order to have the right to subject their children to it.

Mr. Chamberlain states that the substantive regulations dealing with the standardizing of vaccines and serums will be laid before Parliament, and will be available immediately after the Whitsun recess.

Mr. Baldwin has stated that no useful purpose would be served by setting up a Royal Commission on the financial difficulties of the voluntary hospital system.

The Minister of Health announces that it is proposed to instal artificial light treatment at the North Wales Sanatorium, Denbigh. Arrangements have been made for it at the Orthopaedic Hospital at Gobowen and at the Wrexham Dispensary.

A bill to provide for the humane slaughter of animals in Scotland was presented, on June 2nd, by Colonel Moore, supported by Dr. Drummond Shiels.

No women police doctors have been appointed in the Metropolitan Police area.

No standard tests are prescribed to ensure that imported condensed milk complies with the Public Health (Condensed Milk) Regulations, but tests are made at discretion by the Government chemist and by public analysts.

Universities and Colleges.

UNIVERSITY OF CAMBRIDGE.

AT a congregation held on June 4th the following medical degrees were conferred:

M.D.—C. H. C. Dalton, E. H. H. Granger, L. E. H. Whitby.
M.B., B.CHIR.—R. K. Debenham, R. L. Lancaster, R. D. Milford, J. H. Randall, R. E. Smith.
M.B.—H. V. Dicks, H. V. Coverdale.

UNIVERSITY OF LONDON.

THE following candidates have been approved at the examination indicated:

THIRD M.B., B.S.—*†G. C. Babington, *†‡Max Barer (University medal), *‖E. A. Freeman, *†G. R. N. Henry, *‡§Winifred A. Ladds, *†Florence Louis, *‖J. M. Turner, *‡E. C. Warner, *†§H. L.-C. Wood, C. E. H. Anson, Cécile H. D. Asher, A. L. Banks, J. T. Barr, R. E. Barrett, D. E. Barton, A. D. Belilios, Joan H. Blackledge, D. A. Blount, Eleanor D. Blunt, Hilda M. P. Bond, D. G. Bown, D. A. Brigg, Muriel Brighton, Margaret H. Brown, Helen M. Browne, Helen R. B. Buck, T. S. Cochrane, A. Cohen, Mary C. E. Constantine, E. S. Curtiss, F. J. Darbyshire, G. I. Davies, T. E. Davies, J. Dean, A. E. de Chazal, Jean M. Dollar, Margaret R. Dunlop, M. H. C. Dyson, J. Evans, F. M. M. Eyt n-Jones, Dora J. Fox, A. E. Fraser-Smith, J. Gabe, B. M. C. Gilsenan, A. S. Gough, W. P. Greenwood, C. H. Hampshire, Kathleen Heyes, H. F. Hiscocks, Janet I. Hoare, Joan Houseman, E. G. Howe, Ausa H. Jackson, Margaret E. Ledger, W. Leslie, A. H. Levers, Marian Lones, Joan L. Lush, Joyce McConnell, A. C. MacLeod, G. S. Malik, C. W. Marshall, I. Muende, J. W. Nankivell, Helen E. M. Newman, Joan Nixon, Marjorie E. Parfitt, S. M. Power, Marion Ravell, J. H. O. Roberts, L. Roberts, W. C. Robinson, Enid H. Rockstro, S. T. Seccombe, M. Sendak, J. Silverstone, K. S. Smith, G. E. F. Sutton, F. W. Ta'Bois, Kathleen E. Tresilian, Maeve Whelen, Elizabeth M. Whishaw, J. S. Whitton, H. K. Williams, B. H. H. Wooderson, E. Wornum.

* Honours. † Distinguished in Medicine.
‡ Distinguished in Pathology. ‖ Distinguished in Surgery.
§ Distinguished in Midwifery.

Group I.—Marjorie F. Brierley, D. A. Dewhirst, Phyllis M. Edgar, L. Fatti, A. Golombek, C. B. Huss, Caroline M. Kingsmill, F. E. Kingston, R. A. V. Lewys-Lloyd, Isabella L. H. Livingstone, W. E. Lock, Helen E. Mayfield, Bertha I. Meyer, Ethel E. M. Ogilvie, Evelyn D. Owen, G. E. B. Payne, Margaret E. Peaker, K. R. T. Peiris, E. S. Phillips, R. L. Quilliam, E. W. Skipper, J. R. C. Spicer, Victoria W. Symonds, Olive M. Thomas, F. S. Thornton, Winifred M. Turner, Joan B. Walker, R. F. Ward, R. M. Williams, H. D. Wyse.
Group II.—G. T. Allerton, C. A. Amesur, V. FitzC. Anderson, C. G. Bowen, F. W. Bradley, P. J. L. Capon, J. A. Cholmeley, Doris B. Clay, R. R. Fells, P. H. Flockton, J. R. Forrest, K. T. Gajjar, Dorothy Godden, C. H. Harper, T. H. Hobbes, K. H. Lachlan, M. L. Maley, W. D. Nicol, N. D. Patel, G. M. Phadke, B. F. Russell, C. F. J. Smith, W. R. C. Spicer, Kathleen M. Stuart-Harris, Olive F. Sydenham, E. C. Tamplin, F. Welsh, J. G. Weston, C. L. Worthington, Elsie B. Wright.

UNIVERSITY OF BIRMINGHAM.

DR. I. DE BURGH DALY, Lecturer in Experimental Physiology Welsh National School of Medicine, University of Wales, Cardiff has been appointed to the Chair of Physiology, vice Professor E. Wace Carlier, retired.

At the annual degree congregation to be held on Saturday, July 2nd, the honorary degree of LL.D. will be conferred upon the following members of the medical profession: Sir David Ferrier, F.R.S., Sir Watson Cheyne, Bt., K.C.M.G., F.R.S., and Sir Walter Fletcher, F.R.S., secretary of the Medical Research Council.

ROYAL COLLEGE OF SURGEONS IN IRELAND.

AT the annual meeting of the Royal College of Surgeons in Ireland, held on June 2nd, a resolution was adopted unanimously thanking Mr. R. Charles B. Maunsell, the ex-President of the College, "for the admirable and successful services he rendered the College, and, indeed, the profession in Ireland in general, in connexion with the settlement of medical registration in the Free State, after consultation with the members of the Executive Council of the Dail."

The Services.

INDIAN MEDICAL SERVICE DINNER.

THE annual dinner of the Indian Medical Service will be held at the Trocadero Restaurant on Wednesday, June 15th, at 7.15 for 7.30 p.m., when Major-General R. W. S. Lyons will take the chair. Tickets and all particulars may be obtained from the joint honorary secretary, Colonel J. J. Pratt, I.M.S. (ret.), 18, Nevern Mansions, Warwick Road, London, S.W.5.

DEATHS IN THE SERVICES.

LIEUT.-COLONEL EDWARD TEMPLE HARRIS, D.S.O., I.M.S., died of peritonitis, on May 24th, at Mayoyo, Burma, aged 49. He was born on April 27th, 1878, the son of the late Dr. A. B. Harris of Falmouth, and educated at Christ's College, Cambridge, and at the Middlesex Hospital. He graduated as B.A. and B.C. in 1903, and as M.B. in 1904, at Cambridge. After filling the post of house-physician at Middlesex Hospital, he entered the I.M.S. on August 31st, 1903, and attained the rank of lieutenant-colonel on February 28th, 1923. He served throughout the recent great war, was thrice mentioned in dispatches, and received the D.S.O. in 1917.

Captain Gautam Kumar, I.M.S., died on April 4th, aged 32. He was born on June 15th, 1894, and educated at the Punjab University, Lahore, where he graduated M.B. and B.S. in 1918. Entering the I.M.S. as a temporary lieutenant on July 23rd, 1918, he received a permanent commission on November 1st, 1920, and became captain on July 23rd, 1921. He served in the latter part of the recent great war.

Medical News.

THE ninety-first annual report, for the year 1926, of the Royal Medical Benevolent Fund is a volume of 200 pages, a large proportion of them, in the nature of things, being given to lists of donors and subscribers. Matter of most general interest will be found in the brief report of the Committee of Management, presented to the annual meeting two months ago, and reported in our issue of April 16th, p. 740. It will be recalled that during the year there was an increase of £1,050 in new subscriptions, and altogether 622 persons were relieved by grants or annuities. The income from subscriptions and donations was £7,250, and from invested property £4,718. The total distribution was £10,770, and the working expenses were £1,367. Discussing the financial position generally the committee expressed the hope that as the result of the organization set up by the British Medical Association, the income of the Fund would increase, and thus enable assistance to be disbursed on a larger scale. Grateful acknowledgement is made to the continued assistance of the Association in collecting subscriptions from its members; these amounted to £1,141 in 1926. Thanks are also tendered to the editors of the *British Medical Journal* and the *Lancet* for their help by publishing monthly reports of the meetings and in other ways.

IN connexion with the approaching Annual Meeting of the British Medical Association in Edinburgh next month it may be well to remind members proposing to attend that the Hotels and Lodgings Committee has taken over all the available rooms in the city. Dr. Drever, the Scottish Medical Secretary, 6, Drumsheugh Gardens, Edinburgh, has undertaken the work of allocation, and members requiring rooms should communicate with him without delay. Very few single rooms are available in hotels, but there are some in boarding houses and hostels, and there are plenty of double rooms. Members proposing to attend the meeting who have made their own arrangements for accommodation are requested to notify Dr. Drever.

THE summer dinner of the Australian and New Zealand Medical Association in England will be held on June 17th at the Piccadilly Hotel. Mr. Joseph Cunning will be in the chair, and Sir John Bland-Sutton, Bt., will be the official guest. Medical visitors are invited to communicate with the honorary secretaries, E. T. C. Milligan and Bedford Russell, 86, Harley Street.

THE annual meeting of the Sheffield Association of the Medical Women's Federation will be held in the Medical Library, the University, Sheffield, on Saturday, June 25th, at 3.45 p.m., when an address will be delivered by Dr. Helen Boyle (Brighton) on manifestations of nervous instability. A cordial invitation is extended to all members of the profession to be present.

THE next meeting of the Biochemical Society will be held in the Biochemical Department, The Museum, Oxford, to-day (Saturday, June 11th) at 3 p.m.

SIR RICHARD T. GLAZEBROOK, K.C.B., F.R.S., formerly Director of the National Physical Laboratory, has been appointed a member of the Advisory Council for Scientific and Industrial Research.

THE General Medical Council has republished the report on the conditions under which medical and dental practitioners registered or legally qualified in their own country may practise abroad. The book first appeared in 1910 and subsequent editions were issued up to 1921. Lists are included of countries in which medical practice is permissible without legal qualifications, and of those where naturalization is an essential requirement. The information given is for the most part of a general nature, but in every case an address is supplied of an official from whom further information may be obtained. The volume, which is obtainable from Messrs. Constable and Co., Ltd. (10, Orange Street, London, W.C.2), at the price of 2s. 6d. (postage extra), will be found very valuable by those who are contemplating medical practice in foreign lands. The Dental Board of the United Kingdom has prepared a memorandum (price 1s., post free) on the procedure to be adopted by those who wish to enter the dental profession, with notes on the costs and prospects. Reference is made to the system of bursaries instituted by the Board, and it is suggested that a considerable increase in the number of dental students is desirable. Further information about these bursaries may be obtained from the Registrar of the Dental Board, 44, Hallam Street, Portland Place, W.1.

AN employment bureau for convalescent patients from tuberculosis has been opened by the Society of Superintendents of Tuberculosis Institutions, with a temporary office at 122, Harley Street, W.1. Lists of vacant posts will be supplied at intervals to members of this society and the Tuberculosis Society.

THE fifth congress of French-speaking pediatrists will be held at Lausanne next September, when the following questions will be discussed: Treatment of paralyses in childhood; vaccine treatment of bronchopneumonia.

THE Accademia dei Lincei of Rome, founded in 1603, has received an annual donation of 4,275 dollars from the Rockefeller Institute for the purchase of scientific periodicals.

A BUST of Emil von Behring was recently unveiled in the hall of honour of Mexico University, of which he had been made a doctor *honoris causa* in 1910.

DURING 1926, 1,614 cases of acute poliomyelitis with 171 deaths, and 6,787 cases of puerperal fever with 1,872 deaths, were notified in Germany.

WE have received a copy of the fourth volume of papers emanating from the Obstetrical and Gynaecological Clinic of Copenhagen University. It consists of a collection of seventeen articles in French, German, English, or Danish, which have been published elsewhere, with an appendix dealing with the statistics of the clinic for the year 1925.

A PAMPHLET describing the natural brine baths of Droitwich can be obtained from Mr. H. Berkeley Hollyer, Baths Offices, Droitwich. A detailed account is given of the various forms of treatment and of the surrounding country, with numerous illustrations.

Letters, Notes, and Answers.

All communications in regard to editorial business should be addressed to ***The EDITOR, British Medical Journal, British Medical Association House, Tavistock Square, W.C.1.***

ORIGINAL ARTICLES and LETTERS forwarded for publication are understood to be offered to the BRITISH MEDICAL JOURNAL alone unless the contrary be stated. Correspondents who wish notice to be taken of their communications should authenticate them with their names, not necessarily for publication.

Authors desiring REPRINTS of their articles published in the BRITISH MEDICAL JOURNAL must communicate with the Financial Secretary and Business Manager, British Medical Association House, Tavistock Square, W.C.1, on receipt of proofs.

All communications with reference to ADVERTISEMENTS, as well as orders for copies of the JOURNAL, should be addressed to the Financial Secretary and Business Manager.

The ***TELEPHONE NUMBERS*** of the British Medical Association and the BRITISH MEDICAL JOURNAL are *MUSEUM 9861, 9862, 9863,* and *9864* (internal exchange, four lines).

The ***TELEGRAPHIC ADDRESSES*** are:

EDITOR of the BRITISH MEDICAL JOURNAL, *Aitiology Westcent, London.*

FINANCIAL SECRETARY AND BUSINESS MANAGER (Advertisements, etc.), *Articulate Westcent, London.*

MEDICAL SECRETARY, *Mediocera Westcent, London.*

The address of the Irish Office of the British Medical Association is 16, South Frederick Street, Dublin (telegrams: *Bacillus, Dublin*; telephone: 4737 Dublin), and of the Scottish Office, 6, Drumsheugh Gardens, Edinburgh (telegrams: *Associate, Edinburgh*; telephone: 4361 Central).

QUERIES AND ANSWERS.

"T. D." asks for advice in the treatment of a man, aged 62, who, for the past three years, has suffered every three or four weeks from attacks of vomiting, accompanied by profuse perspiration, and lasting from one to six hours. The patient has been examined by a specialist and has been given laxatives, without improvement.

NEURITIS AND ULTRA-VIOLET RAYS.

DR. C. BURGOYNE PASLEY (Perak, F.M.S.) asks for suggestions for the treatment of a woman, aged 40, in whom neuritis developed after exposure to ultra-violet rays. She had resided in the tropics for many years, but underwent two operations while on leave recently in England (tonsillectomy for septic tonsils and gastro-jejunostomy for gastric ulcer). Since her return to the East she has suffered from anaemia and general debility. She was treated by moderate doses of ultra-violet rays, which were increased weekly up to an exposure of six minutes. She always complained of fatigue after the treatment, but her appetite improved somewhat. Early in March she contracted influenza and was ill for a week. Four days after recovery rather severe sciatic pains developed and persisted for two days, and she was then attacked by acute neuritis in both hands. The thenar eminences, thumbs, and index fingers were chiefly affected; the pulp of the terminal phalanges became very tense and painful, and there was moderate pain over the shoulder girdle and posterior aspect of the neck. At the present time (one month after the commencement) the pain is rather less in all regions. Little benefit resulted from drugs, with the exception of local applications of belladonna; a short exposure to ultra-violet light seemed to increase the pain. Dr. Pasley asks whether the neuritis could have been caused by the light treatment, and if it is contraindicated in such a case.

PRECORDIAL PAIN.

"A. O. W." writes in reply to the medical man, resident abroad, whose inquiry appeared on May 14th (p. 908), suggesting that he should wholly abandon the use of tobacco and not expect much benefit for four to six weeks, as it takes that time to eliminate the nicotine. Meanwhile, let him take small doses of calomel—say, 1/5 grain—every night till he gets fairly free motions, and three times a day 5 grains of aspirin of a high quality.

INCOME TAX.

Payment of Bank Interest.

"S. P." paid £82 interest on bank overdraft, and claimed repayment thereon on the ground that the interest was paid out of taxed income. The amount repaid has been reduced by setting off the amount of earned income relief due in respect of £82.

*** The ground for the set-off is presumably that the overdraft was obtained for professional purposes and that the amount of the interest could have been deducted as a professional expense. If that is so the earned relief would have been affected by reduction of the amount of earned income assessed and an appeal would not be advisable.

Obsolescence of Car.

"F. H." has forwarded a copy of the local inspector's figures, from which it appears that in computing the obsolescence allowance he has deducted from the cost of the car (£252) the total amount of wear and tear during the life of the car, instead of

£56, the amount actually allowed for tax purposes under the Finance Act, 1925.

*** Rule 7, applicable to Cases i and ii, Sch. D, of the Income Tax Act, 1918, uses the words "after deducting from that cost the total amount of any allowances which have at any time been made in estimating profits or gains as aforesaid on account of the wear and tear . . . ." The inspector's calculations seem clearly inconsistent with the plain meaning of the words "allowances which have . . . been made."

Motor Car Allowance.

"A." replaced his car in December, 1925, by one of the same make and value (£225), being allowed £125 for the old car; the net cost, therefore, was £100, which sum was allowed as an expense of the year 1925–26. For the financial year 1926–27 "A." claimed depreciation allowance for the new car on £225, but the local inspector will allow depreciation on a value of £180 only—that is, on the value (as he reckons it) at April, 1926.

*** This is not, so far as we know, in accordance with the practice in professional or commercial concerns. It is true that the courts have endorsed the practice of taking the value as at the commencement of the year for the wear and tear allowance, but it is usual to ignore fractions of a year. In any case the inspector's figures need revision; even if the new car was bought as early as December 5th there would be only one-third of the year's depreciation to take into account at April 5th, 1926—that is, £15, not £45, and the 1926–27 allowance will be 20 per cent. of £210=£42. If the inspector agrees to this we advise our correspondent to let the technical point go; in the long run the matter will rectify itself automatically on an obsolescence claim when the new car is replaced.

LETTERS, NOTES, ETC.

THE MEDICAL MAN IN PARLIAMENT.

DR. NATHAN RAW writes: In his address to the Chelsea Clinical Society, reported in the BRITISH MEDICAL JOURNAL of June 4th (p. 1024), Dr. Graham Little, M.P., describes the work of the medical group at present in Parliament. It might appear from the report that the present committee was the first of its kind in the House of Commons. I am sure Dr. Little would not wish to convey that impression. In the Parliament of 1918, of which I was a member, we had a committee composed of the medical and University members of Parliament and Lord Dawson from the House of Lords; we met every month during sessions, and many important legislative questions concerning public health were discussed in detail. The committee was composed of Sir Watson Cheyne (chairman), Sir William Whitla, Lord Dawson, Sir Philip Magnus (then member for London University), the late Sir Henry Craik, Colonel Fremantle, Major Molson, Major Farquharson, Dr. McDonald, Captain Walter Elliot, Dr. Murray, and myself. It received numerous deputations on questions concerning the medical profession. It was in close touch with the British Medical Association, and was able to tender advice and guidance which was much appreciated by the Government of the day.

DR. GRAHAM LITTLE has also written in order to remove any misapprehension that may have been caused by the phrase that there are "about two hundred practising lawyers in the House of Commons." What he had intended to convey, he says, is that there are probably that number of persons in the House who are qualified to practise law, though a smaller, but still considerable, number actually do so. His object was to point out that from his own experience he could assert the possibility of combining parliamentary duties with a consulting and hospital practice. "It is," he continues, "obviously more difficult for a general practitioner than for a consultant to serve in Parliament, but I wish to make the definite point that the combination of medical and parliamentary work is possible, and that more opportunities should be given for men in practice to enter Parliament. It will hardly be disputed that a man in practice is more able to gauge the feeling of the profession than one who has no further contact with it."

DANGERS OF HIGH-POWER X-RAY APPARATUS.

IN view of the possibilities of accidents occurring to users of the modern types of high-power *x*-ray apparatus, Messrs. Watson and Sons are issuing with each set of apparatus supplied a placard of warning, which it is intended should be hung up in a conspicuous position in a department; it consists of some ten paragraphs, which point out the chief dangers and the methods of avoiding them. These are the dangers, not of *x*-rays themselves, but those arising from the actual electric supply and from the high tension currents, etc.; that there is actual danger to life from such causes is evidenced by the fact that a short time ago a doctor and nurse were both killed instantaneously when making an *x*-ray examination of a patient.

VITAL CAPACITY AND ARTIFICIAL EXERCISES.

DR. HORACE HILL, M.R.C.P., of the R.N. School of Physical Training, Portsmouth, writes to criticize exercises designed to enlarge the thorax artificially by direct force and leverage, and done with the idea that these increase vital capacity and produce physical fitness. A man with a very small vital capacity may, he states, be very fit, and a big chest measurement may be associated with a small vital capacity. Increased pulmonary capacity does not imply a good "wind," power of endurance, resistance to disease, or ability to work. A good "wind" depends upon the co-ordination of the heart and lungs, and is best obtained by graduated running in the open air. Unless the circulation carries the oxygen to the tissues, the passage of large volumes of air in and out of the lungs is useless. Enlarging the thorax artificially, while ignoring the physiological processes within it, is comparable with increasing the size of the abdomen to make room for more food, irrespective of the process of digestion; the body cannot be forced in this way to absorb more air or more food. Investigations of the vital capacity are, therefore, of little value unless the reaction of the heart to the different states of respiration is tested at the same time. Moreover, the vital capacity varies rapidly, owing to temporary causes, such as nervousness, a meal, or a cold. If the vital capacity is deficient and no lesion can be found, the best treatment is exercise out-of-doors and graduated runs, which cause natural and deep breathing, and train the heart concurrently.

THE TREATMENT OF SMALL-POX.

DR. J. BARCROFT ANDERSON (London) writes: I venture to think many members of the profession would like to be reminded of the information you published on October 11th, 1913 (p. 906), being a report by the Director of the Medical Department at Mauritius upon the results of treating with daily intravenous injections of electrargol about 150 of the worst cases of small-pox selected during an epidemic which attacked 1,500 persons. He wrote: "If cases are treated before the full development of the rash, no matter how close the papules may be, they go no further. Those that have already begun to suppurate dry up. Those that have not yet suppurated do not do so, and those that are not yet papular remain simple maculae and die away. The secondary fever does not appear, and the case takes a favourable turn after the first injection." The dose he recommended was 20 c.cm.

PARALYSIS OF THE CERVICAL SYMPATHETIC COMPLICATING MUMPS.

DR. M. C. TORRANCE (London, E.) writes: Cases of paralysis of the cervical sympathetic are in themselves rare, but its occurrence as a complication of mumps is, I believe, sufficiently rare to warrant recording. On April 4th I attended a girl, aged 5 years, with a six weeks' history of mumps, which began in the right parotid gland. One week after the commencement of the attack she complained of vertical and right parietal headache, and the mother noticed that the patient's right upper eyelid was drooping. On examination I noticed that she had ptosis, exophthalmos, and miosis of the right eye. The orifice of Stenson's duct on the right side was inflamed and remained so until May 14th, when she still had the triad of signs of paralysis of the cervical sympathetic. It would be interesting to hear of any similar case complicating mumps.

HERPES AND VARICELLA.

DR. WILLIAM GALLAUGHER (Brighton) writes: I do not find it so easy to trace the connexion between these two diseases, as Dr. Heard suggests. I have had eight cases of herpes this year and am attending five at present. In each case I have made careful inquiry regarding possible contact with varicella, but have in no case traced any connexion. I have not had a case of varicella for some months. I should say it is of the same order of infectiousness as primary pneumonia.

BEDCLOTHES.

THE "Bed-cloz-tuk" is a device for preventing bedclothes from slipping off the sleeper when in bed. The instrument is fixed by straps, or screwed, to the frame of the bed, so that when not in use it does not interfere with the clothes. By pulling up a small nickel-plated handle after getting into bed the clothes are gripped by rubber pads, and a coil spring and strap prevent any tightness and allow the bedclothes to expand with movement and with respiration. The device is simple and ingenious. It is sold in four models at 7s. to 8s. the pair, according to whether it is required for children's cots, adults' beds, ship bunks, or settees. The inventor and vendor is Mr. S. H. Bartter, 8, St. James's Road, Kingston-on-Thames.

CZECHOSLOVAKIA.

IN the article on Prague in our issue of May 28th there was a slip which we would like to correct. The present Czechoslovakian Minister of Public Health, who entertained the party of British medical men during their visit to Prague, is Dr. Josef Tisó, a clerical statesman from Slovakia. His predecessor in that office was Mr. Jan Sramek.

CORRECTION.

DRS. ETHEL CASSIE and URSULA COX wish to correct an error in their paper on the microscopical and chemical examination of stools in young children (JOURNAL, May 28th, p. 959). In the table on page 960 it should have been stated that the stools of breast-fed children are 100 per cent. acid—not, as printed, 100 per cent. alkaline.

VACANCIES.

NOTIFICATIONS of offices vacant in universities, medical colleges, and of vacant resident and other appointments at hospitals, will be found at pages 35, 36, 37, 38, 39, 42, and 43 of our advertisement columns, and advertisements as to partnerships, assistantships, and locumtenencies at pages 40 and 41.

A short summary of vacant posts notified in the advertisement columns appears in the *Supplement* at page 239.

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EXECUTORSHIPS AND TRUSTEESHIPS UNDERTAKEN.

Intestinal Disinfection

ALLERGIC CONDITIONS & PROTEIN SENSITISATION

MUCH attention has of late been directed to states in which the subject has become sensitised to some substance, and on exposure to the same substance reacts in a characteristic manner.

The substances which may sensitise are very varied (*e.g.*, animal dandruff and hairs, plant pollens and hairs, animal and vegetable proteins of foods, bacteria and their products) and the reaction may take the form of epileptic attacks, fainting fits, skin eruptions, asthma, etc.

In many instances the sensitisation is produced by bacteria or their products in the bowel, and by the exhibition of an efficient intestinal disinfectant the subject is cured. This has been found to occur in many cases of asthma, eczema and other skin diseases.

The best of all intestinal disinfectants is Kerol, which acts as a specific cure in many of these cases.

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Absolutely pure and perfectly stable. The original preparation and the most physiologically active solution of Bismuth. Dose: One drachm, diluted.

PEPSINA LIQUIDA "SCHACHT."

A palatable, standardized solution of gastric juice from the pig. Useful in the treatment of dyspepsia. In ten-minim doses it gives excellent results in infantile diarrhœa. Adult dose: One drachm, diluted.

PEPSINA LIQUIDA C. BISMUTHO "SCHACHT."

Each fluid drachm contains in a concentrated form, besides the Pepsina Liquida, one fluid drachm of Liquor Bismuthi "Schacht." Dose: One drachm, diluted.

PEPSINA LIQUIDA C. BISMUTHO CO. "SCHACHT."

Contains one grain of Soluble Euonymin in each fluid drachm, in addition to the Pepsine and Bismuth. Dose: One drachm, diluted.

BISEDIA.

A combination of Schacht's Liquor Bismuthi and Pepsina Liquida, with Morphia and Hydrocyanic Acid. Of the greatest value in the treatment of Acute Dyspepsia, Gastric Ulceration, Vomiting of Pregnancy, etc. Dose: Half to one drachm, diluted.

LIQ. CASCARÆ DULCIS "SCHACHT."

A palatable and very concentrated aromatic preparation of the finest Cascara Sagrada; free from bitterness and griping action. Dose: Quarter to one drachm.

LENIVA.

An excellent fruit laxative syrup, containing Alexandrian Senna, Figs, Prunes, Tamarinds, etc. Eminently suitable for delicate women and children. Dose: Half to two drachms, according to age.

GILES, SCHACHT & CO.,
BRISTOL, ENGLAND.

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